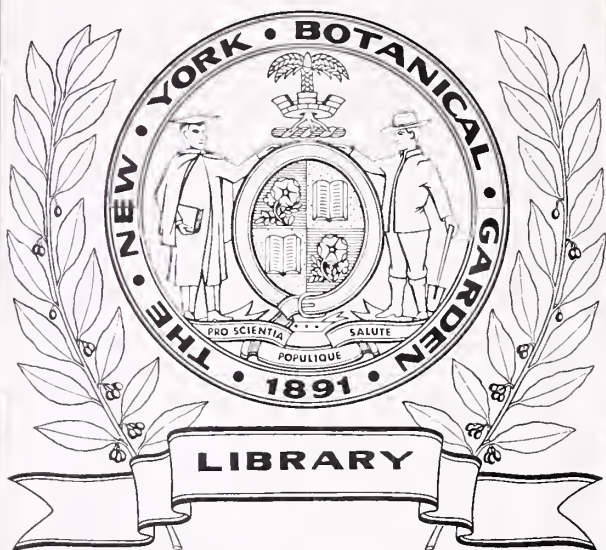



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ARNOLD ARBORETUM
HARVARD UNIVERSITY

ARNOLDIA



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VOLUME IX

1949

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ARNOLDIA



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NUMBER 1

SOURCES FOR A FEW NEW PLANTS

IT is one thing to talk and write in glowing terms of some new or unusual woody plant, but it is quite another thing for would-be owners of such plants to find sources for them among commercial nurserymen. Most nurserymen are continuously looking for something "new" with which to embellish their catalogues, but all too often there are restrictions placed about such plant materials. The "new" plant must be easily propagated; the individual nurseryman would usually like to be the sole source for such a plant; it must grow quickly and make a sizeable plant in a short time; it must be well known before he will propagate it on a large scale.

This last requirement is often the end of many a good plant before it even gets into commercial production, merely because it takes considerable time and money in advertising to create the proper demand. Many a commercial propagating establishment is not equipped to take the risk. Articles and news releases from arboretums and botanical gardens frequently have all the information about such plants, but do not reach a sufficiently wide public to create the desired demand. Consequently, as a result, many a "new" plant quickly reverts to the category of being "rare," and there it may stay indefinitely.

As a result of glancing through some recent nursery catalogues, I was surprised and pleased to find a number of plants listed which have been recommended in Arnoldia for years. Most of the plants on the following pages (but not all) have been introduced by the Arnold Arboretum, but the commercial nurseries should be given the credit for making them available to the gardening public. It would be impossible to list all the plants which have been so treated in the last ten years, but the following fifty plants have been repeatedly recommended in these pages and are being propagated and offered for sale by nurserymen this year.

Of course there are other plants, and other nurserymen offering these same plants as well. The following fifty plants did not appear in nursery catalogues

of ten years ago and have been repeatedly recommended in *Arnoldia* as being good plants for the garden. The twelve nurserymen listed should be given due credit for making these available. Apologies are offered to other nurserymen who may have been propagating these plants during the same period, but whose catalogues have not been examined.

This list is being published merely to show that our efforts in trying to popularize new plants are not in vain, and that we appreciate the efforts of these commercial propagators and others who make such good plants available to the public.

Nurseries

1. Bobbink & Atkins, East Rutherford, New Jersey.
2. Cole Nursery Company, Painesville, Ohio.
3. Kelsey-Highlands Nursery, East Boxford, Massachusetts.
4. Kingsville Nurseries, Inc., Kingsville, Maryland.
5. Henry Kohankie & Son, Painesville, Ohio.
6. Linn County Nurseries, Center Point, Iowa.
7. Littlefield-Wyman Nurseries, Abington, Massachusetts.
8. Siebenthaler Company, Catalpa Drive, Dayton, Ohio.
9. Tingle Nursery Company, Pittsville, Maryland.
10. Upton Nursery Company, 4838 Spokane Street, Detroit, Michigan.
11. Wayside Gardens, Inc., Mentor, Ohio.
12. Weston Nurseries, Inc., Weston, Massachusetts.

"New" Plants (available in 1949)

(The number refers to the nurseryman offering the plant.)

<i>Acer campestre</i> compactum 4	<i>Cytisus</i> purpureus 4
<i>Acer griseum</i> 4, 5	<i>Forsythia intermedia</i> primulina 5, 9
<i>Acer platanoides</i> columnare 8, 12	<i>Forsythia ovata</i> 3, 4, 5, 6, 11, 12
<i>Acer platanoides</i> erectum 7	<i>Ilex crenata</i> convexa 4, 5, 8, 9, 11, 12
<i>Acer rubrum</i> columnare 2, 4, 5	<i>Kalopanax pictus</i> 5
<i>Acer saccharum</i> monumentale 4, 5, 7	<i>Liriodendron tulipifera</i> fastigiatum 5
<i>Albizzia julibrissin</i> rosea 5, 9	<i>Magnolia kobus</i> borealis 5
<i>Berberis koreana</i> 5	<i>Malus baccata</i> mandshurica 5
<i>Carpinus betulus</i> fastigiata 5	<i>Malus</i> "Bob White" 12
<i>Celastrus flagellaris</i> 4	<i>Malus dawsoniana</i> 9
<i>Cyrilla racemiflora</i> 4	<i>Malus</i> "Gloriosa" 4, 9
<i>Cytisus praecox</i> 2, 4, 12	<i>Malus</i> "Katherine" 4



PLATE I
Philadelphus lemoinei "Belle Etoile"

Malus "Prince Georges" 4	Syringa "Hiawatha" 6
Malus purpurea lemoinei 4, 5, 9, 11	Syringa "Isabella" 5
Malus "Red Silver" 4, 12	Syringa "Miranda" 6
Parrotia persica 4, 5	Syringa persica laciniata 4, 10
Philadelphus "Atlas" 4, 8, 11	Syringa pubescens 4, 5
Philadelphus "Belle Etoile" 4, 11	Tilia americana fastigiata 5
Philadelphus splendens 5	Tsuga diversifolia 4
Prinsepia sinensis 4, 5	Ulmus carpinifolia sarniensis 5
Prinsepia uniflora 4	Viburnum dilatatum xanthocarpum 4, 5
Prunus davidiana 5	Viburnum opulus xanthocarpum 4, 5, 8, 11
Quercus imbricaria 5	Weigela "Othello" 4, 11
Spiraea bumalda crispa 11	Wisteria floribunda vars. 5, 11
Stewartia koreana 4	
Syringa "Guinevere" 4	

DONALD WYMAN

Arnoldia subscriptions are now due. Those who have not yet sent in their 1949 subscriptions, please do so (price one dollar) and mail to Arnoldia, Arnold Arboretum, Jamaica Plain 30, Mass. Please make checks payable to Harvard University.

Field Class

A Field Class for the study of the more ornamental of the flowering trees and shrubs as they are growing in the Arnold Arboretum, will again be conducted during the Saturday mornings of May. Please write for further information.

ARNOLDIA



A continuation of the
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NUMBER 2



PLATE II

Porch Azalea (*Rhododendron obtusum kaempferi*)

THE AZALEA BORDER

WORK has gone forward steadily in the last two years since suggestions were made in November, 1946, regarding possible changes in some of the landscape planting at the Arboretum. The bulk of the necessary drudgery of clearing up is now done, and new reconstruction work has been started.

Opposite the Administration Building the border close to the marsh has been cleared of overgrown colonies of shrubs of various unrelated sorts, and in their stead a plantation chosen chiefly from the Ericaceae is being assembled. The heaths belong to a beautiful family; it is hard to think of a single member that has not some special distinction and elegance; from the flat and fragrant mats of mayflower (*Epigaea repens*) to the tall rhododendrons and sourwoods. The position for this planting is ideal, as many of the heath family enjoy having their toes in or near water, and the gentle slope from the marsh level up to the road gives an excellent place to those which prefer drainage in addition to moisture. The tall species, such as the laurels and evergreen rhododendrons, will not be found in this plantation which is only the forerunner of a series of azalea groups. In order to give the plants the rooting medium and food they like, many loads of peat have been added to the border, and in the open and sunny spaces between the punctuating trees new colonies have been set out, so that in the future, when the plantation reaches maturity, colours will harmonize and give interest from earliest spring to latest autumn.

Immediately inside the entrance the quiet open view over the marsh is maintained by low ground-hugging shrubs like bearberry, low blueberry and pachistima, ending in a higher mass after the first vista has been enjoyed. The earliest of the deciduous rhododendrons, known formerly as azaleas, start the procession with rhododendrons, *mucronulatum*, *dauricum* and *canadense*. The crinkled petals of *mucronulatum*, when they first appear, look as though they had been ill packed during the winter in a small valise, but they soon lose their wrinkles in the sun and air and show their deep maroon brown dots at the centre of the tremulous wind-swept flowers. These early and somewhat difficult shades are kept together as they do not agree with the pink, orange and red sorts. The lavender species bloom early, and where they thrive, as they should in their new position, they are a heartening sight to eyes seeking flower and colour after the long blank of winter. Some of the best of the old shrubs have been kept among the azaleas as dividing marks on what might otherwise be an overlong uninterrupted parade.

There are islands and tufts of Shadbush (*Amelanchier*) and later on clumps of Labrador tea and leatherleaf will be added among the huckleberries and tall growing blueberries. The pink azaleas begin with the earliest, the deceptively fragile looking Appalachian mountain *Vaseyi*, which is hardy in the far north and flowers generously each year if given proper food. After the *Vaseyis* have made their appearance the Schlippenbachs from China spread their large pearly

pink petals. This Chinaman has taken kindly to our country and is never dull or dowdy. After the flowers wither the new buds appear tightly folded in their scales awaiting the next spring. During the summer the oak-like leaves are healthy and give character to the plant, and in the autumn they colour brilliantly from pinkish orange to deep maroon. After the Schlippenbachs come colonies of eastern American species, *arborescens*, with its deep red stamens lifting themselves from the pale pink flowers, and *viscosum*, the latest and sweetest and tallest of our native sorts. The *nudiflorum* and *roseum* follow, but bloom earlier than the *viscosum*. *Enkianthus* and good *Phellodendrons* make a definite break between the native pink species and their hybrids. Some of the older plantations of Sumach have been kept, and these are intended to act as a division between the American hybrids and the equally native *Rhododendron calendulaceum* and their fellows in the orange scarlet and yellow shades.

The first years of this new plantation will not be as attractive as the later ones, since many older plants have been used which had to be neglected in the past. Some will look ungainly as they have been taken from crowded masses and this has meant hard pruning in order to give them a fresh start. As the marsh meadow border develops, further little tufts and wisps of the smaller *Ericaceae* will be tucked into the bays and hollows of the long line, and a walk next to the meadow will be made, so that the plants may be looked at from the marsh and from above on the level of the Meadow Road.

The work done would not have been possible without the enthusiastic and understanding help of all who are vitally concerned in the welfare of the Arnold Arboretum.

BEATRIX FARRAND



ARNOLDIA



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NUMBER 3

SPRING 1949

SPRING has come to the Arboretum this year a trifle earlier than usual. Unusually warm weather started the forsythia blossoms into bloom a full two weeks earlier than they normally appear, but colder weather of mid-April slowed them up again so that at the time this is being written it is safe to say that the season is advanced by about one week.

The Arboretum has not looked so clean for a long time. A trip through it at this time shows most plants in splendid condition. A comparatively mild winter, with not too much snow, did no damage to any of the plants. Heavy snow storms and high winds of late February and March failed to materialize so that no damage has been encountered on this score. Sometimes, a heavy wet snow or ice storm in March can create terrific damage which may take the entire Arboretum force weeks to clean up. Nothing like this has happened this year, so that it is possible to spend considerable time in some of the collections that are somewhat removed from the view of the general public, but nevertheless are important.

The mulching material (hops) which we have been using for the past few years is apparent now throughout all the collections. Its use has saved much money and time in weeding, and in fact, has actually prevented injury to some of the plants from fire. Some collections like the dwarf conifers received one application a few years ago and since that time the mulch has been worked into the soil. Now this collection is receiving its second application of the same mulch. No method has been found to prevent the potent odors of this material when it is newly applied, but this apparently lasts for a few short weeks only, and then disappears. In early spring it is not freshly applied to the most outstanding of the spring flowering collections, but rather kept on those collections in the hinterland where it will not be too offensive.

The winter was a rather dry one, but fortunately early spring rains have been ample so that regular planting has gone along uninterrupted. Final touches are



PLATE III

Malus halliana spontanea. A rare Japanese crab apple which is unusually beautiful in flower. The flowers are pure white and the profuse, but small, fruits are dark red. The dense, somewhat vase-shaped form is unusual among crab apples. Unheralded and unsung, this has been growing in the Arnold Arboretum since 1919 when it was brought from Japan by E. H. Wilson. This is just another of countless plants growing in the Arnold Arboretum which have not received the attention they really merit. It should be in full bloom the first part of May.

about to be given to some of the trees on the far side of Peters Hill, these being the best of a miscellaneous planting which has not been given the attention it deserves.

A new mist blower (Bean's "Rotomist") was put in operation for the first time this spring. This necessitates the changing over of our rather complicated spraying program from hydraulic methods to mist methods, causing considerable study on our part of the many new (and too often untried) materials for insect and disease control. However, we feel that mist-spraying is a technique which is very definitely going to be used more and more as new materials become available. In our case, the savings from the standpoint of labor are worth the change-over. We are willing, and in fact, anxious, to do what we can in experimenting with this new method, and many new materials, if it is possible to obtain better control of insect and disease troubles, at a reduction of total application costs.

Magnolia loebneri. Among the many interesting plants which have bloomed in the Arboretum already this spring, perhaps none is so interesting as a *Magnolia loebneri* which is growing on former Arboretum property in Weston. This is a cross between *M. stellata* and *M. kobus* (originating before 1910). The tendency is too often to overlook some hybrid crosses after the flowers have been first observed. However, I have had an excellent opportunity of observing this hybrid planted at the Case Estates of the Arboretum several years ago. What is even more important, it is growing within a stone's throw of some *M. stellata* seedlings which are almost as old.

The interesting thing is that this is one of the hybrids in which hybrid vigor has resulted in unusually good growth. The seedlings of *M. stellata* were planted in 1942 and are at present about three feet tall. Of nearly 100 plants only about one or two have flowers this season, about two to three each. This *M. loebneri* was grown from seed sown about 1939, two of the plants are twelve feet high (another is slightly smaller) and are covered with hundreds of flowers. The trees are pyramidal in habit, apparently are going to be tree-like and not shrub-like, and have a spread of about twelve feet. They have bloomed conspicuously for several years. E. H. Wilson used to say of *M. kobus* that it seldom bloomed profusely, certainly not while it was young.

Here, then, is a hybrid which has been with us for some time, but the vigor of which has not been appreciated. The flowers are as large as those of *M. stellata* and have eight to twelve petals—usually about eleven. The petals are twice the width of those of *M. stellata*, and shaped somewhat like those of *M. kobus*. The flowers are fragrant—a rather important feature. The tree blooms at the same time as does *M. stellata* and *M. kobus*, but is meritorious for its vigor and profuse bloom. This early-flowering white magnolia of tree habit might well be propagated. Whether or not it will be as vigorous, or as floriferous when grafted on other understock, remains to be seen. Also it is important to state that since it is a hybrid, there may be several clones, and it is inherent upon all plantmen

to be certain to propagate from the better clones only. One of the clones in the Arboretum is decidedly inferior, having only six to eight petals. Another (discussed above) grown from seed by the Arnold Arboretum, has eight to twelve petals, mostly eleven and so is a much more desirable clone to grow.

DONALD WYMAN

NOTES

Field Class. Once more the **Field Class** to study the flowering trees and shrubs of the Arnold Arboretum meets Saturday mornings throughout May. Meetings will be out-of-doors, beginning promptly at ten o'clock at the Forest Hills Gate. In case of rain the class will meet on the next fair week day. Instruction will be given informally in talks as the different plant groups are watched from week to week. No technical knowledge or special preparation is required.

The fee for the course is \$1.00 payable in advance by mail, with members of the "Friends of the Arnold Arboretum" entitled to attend all classes without charge.

Applications and further inquiries may be addressed **at once** to Dr. Donald Wyman, at the Arboretum. Checks should be made payable to Harvard University.

Through the Arnold Arboretum. The first copies of our new forty-six page guide book to the Arnold Arboretum have just been received. This is an up-to-date description of the Arboretum as it is now, with much of interest concerning its past history. Well illustrated with fifteen half-tones and five full-color plates, this should make an excellent gift for any one who is not familiar with this world-famous garden. Included is an up-to-date map showing where all the main collections are at the present time, and valuable information concerning meritorious plants which the Arboretum has been responsible for introducing. This should make an excellent gift for an out-of-town friend, or a reference to have available for friends who might wish to visit this famous institution. Copies are available postpaid for fifty five cents (stamps accepted).

Correction. The legend under the picture in the last issue of *Arnoldia* (Vol. 9, No. 2) should read: "Torch Azalea (*Rhododendron obtusum kaempferi*)."

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NUMBER 4

LILACS

LILAC time has come to the Arnold Arboretum two weeks early this year. The vagaries of the weather have been such that the oriental crab apples and the lilacs have bloomed together for the first time in many years. In a recent trip through Philadelphia and Washington it was pointed out that in some sections the season is a full two weeks in advance and in others it is not, but everyone in the sections where it is advanced agrees that it has come very quickly—and to many a commercial grower it has come considerably faster than expected. This has resulted in a financial loss to many a nurseryman, whose nursery stock has come into leaf sooner than anticipated and hence his planting season has been shortened.

In ARNOLDIA (Vol. 2, No. 6, April 24, 1942) was published a list of the "One Hundred Best Lilacs" of *Syringa vulgaris* varieties. Now, the following list is offered as being the best of all the lilacs, hybrids and species together—at least of the hundreds which have been on trial in the collections of the Arnold Arboretum.

Not everyone will agree with this short list, particularly with the reduction in number of the *S. vulgaris* varieties. Others may look upon it aghast and remark that every lilac variety has a place in horticulture. However, this viewpoint is hard to accept, especially when one can cut a branch of opening flowers of "Mrs. W. E. Marshall," "Congo," "Ludwig Spaeth" and "Rhum von Horstenstein," mix them up and then defy even the experts to distinguish one from the other. This can be done when the flowers are first opening, and brings up the point that many lilacs are similar—certainly as far as their landscape qualifications are concerned.

The following list of lilacs is admittedly small—many will consider it too small. It does include the best of the lilacs which have been growing in the Arboretum collection for a period of years. Merely because a lilac variety is not listed does

not mean that it is inferior. However, those included can be considered to be among the best landscape plants of all the 450 species and varieties being grown in the collection during the past few years. Some new and recently introduced varieties have not been growing a sufficiently long time to be judged properly. Those who have small gardens, and room for only a very few lilacs, would do well to make their selections from this list, rather than to become entangled with the lengthy lists of names in the larger collections of the country.

RECOMMENDED LILACS

<i>Syringa species and varieties</i>	<i>Height</i>	<i>Normal Time of Bloom</i>	<i>Color</i>
amurensis japonica	30'	mid-June	creamy white
chinensis	15'	late May	purple-lilac
“ alba	15'	late May	white
“ saugeana	15'	late May	lilac-red
henryi “Lutece”	10'	early June	pale violet and pink
henryi × tomentella “Prairial”	9'	early June	fuschia purple
josiflexa “Enid”	9'	“ “	cyclamen purple
“ “Lynette”	9'	“ “	rhodamine pink
josikaea	12'	“ “	lilac violet
laciniata	6'	late May	pale lilac
microphylla	6'	“ “	“ “
nanceana “Floreal”	9'	early June	petunia purple
oblata dilatata	12'	early May	pinkish
oblata dilatata × vulgaris “Assessippi”	12'	“ “	pinkish mauve
“ “ “ “ “Pocahontas”	12'	“ “	reddish purple
oblata giraldi × vulgaris “Catinat”	12'	“ “	pinkish
“ “ “ “ “Lamartine”	12'	“ “	“
“ “ “ “ “Louvois”	12'	“ “	violet
“ “ “ “ “Necker”	12'	“ “	pinkish
“ “ “ “ “Turgot”	12'	“ “	“
“ “ “ “ “Villars”	12'	“ “	lilac
persica	6'	late May	pale lilac
prestoniae	9'	mid-June	pink to deep pink
“ “Ariel”	9'	“ “	petunia purple
“ “Coral”	9'	“ “	rhodamine pink
“ “Dawn”	9'	“ “	“ “
“ “Hecla”	9'	“ “	“ “
“ “Hiawatha”	9'	“ “	“ “
“ “Isabella”	9'	“ “	fuschia purple
“ “Miranda”	9'	“ “	“ “
“ “Nerissa”	9'	“ “	cyclamen purple
“ “Romeo”	9'	“ “	rhodamine pink



The famous Lilac Path in the Arnold Arboretum around which is clustered one of the world's most complete collections.

prestoniae	"Ursulla"	9'	mid-June	fuschia purple
swegiflexa		9'	early June	rhodamine pink
sweginzowi		9'	early June	reddish lilac
villosa		9'	" "	rosy lilac to white
vulgaris		20'	mid-May	lilac
"	alba	20'	" "	white
"	"Vestale" - single			"
"	"Mont Blanc" - single			"
"	"Jan Van Tol" - single			"
"	"Marie Finon" - single			"
"	"Edith Cavell" - double			"
"	"Ellen Willmott" - double			"
"	"De Miribel" - single			violet
"	"Cavour" - single			"
"	"Marechal Lannes" - double			"
"	"Violetta" - double			"
"	"President Lincoln" - single			blue and bluish
"	"Decaisne" - single			" " "
"	"Maurice Barres" - single			" " "
"	"Olivier de Serres" - double			" " "
"	"Emile Gentil" - double			" " "
"	"Duc de Massa" - double			" " "
"	"Marengo" - single			lilac
"	"Jacques Callot" - single			"
"	"President Fallieres" - double			"
"	"Henri Martin" - double			"
"	"Victor Lemoine" - double			"
"	"Leon Gambetta" - double			"
"	"Lucie Baltet" - single			pink and pinkish
"	"Macrostachya" - single			" " "
"	"Mme. Antoine Buchner" - double			" " "
"	"Katherine Havemeyer" - double			" " "
"	"Montaigne" - double			" " "
"	"Marechal Foch" - single			magenta
"	"Mme. F. Morel" - single			"
"	"Capitaine Baltet" - single			"
"	"Paul Thirion" - double			"
"	"Paul Deschanel" - double			"
"	"Mrs. Edward Harding" - double			"
"	"Monge" - single			purple (or deep purple)
"	"Mrs. W. E. Marshall" - single			" " " "
"	"Ludwig Spaeth" - single			" " " "

In going through this list of species and hybrids, it is noted that the time of bloom varies from early May to mid-June, nearly six weeks. This is important in making selections for the small garden. Also the height varies, the lowest being *S. microphylla* and *S. persica*—about six feet tall—and the highest being the tree lilac, *S. amurensis japonica*—about thirty feet tall. The range here is most useful in helping the gardner select the right lilac for the right place.

DONALD WYMAN

NOTE

The Lilac Path in Color

ARNOLDIA subscribers and friends of the Arboretum have known that pictures in full color have been taken as a matter of course since 1936. All color films have been used, some with better success than others. The collection of color transparencies on file in the Arboretum now numbers well into the thousands. Many of these are used in lectures by staff members, many are for record purposes in noting differences among the horticultural varieties.

The new guide book, "Through the Arnold Arboretum," contains five color prints made from selected transparencies. It is obvious that color reproduction (i.e. printing on paper) has not kept advancing as rapidly as color photography; yet even with its limitations, some color pictures tell a better story than do black and white pictures. Some do not! However, ARNOLDIA readers will receive these first few color reproductions from time-to-time so that they, too, may have reminders of the glorious color displays made by the plants that grow in the Arnold Arboretum.

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THE WISTERIAS*

THE Arnold Arboretum wisteria collection now contains some 35 species and varieties, not all that are being grown in this country today, but certainly a goodly representation. These lovely twining vines are widely used as ornamentals in the gardens of this country, and those who have travelled in Japan will long remember the striking specimens as they are grown there. They are without doubt among the best of our ornamental vines. Many gardeners have found them easy to grow, still others most difficult, but all will agree they are outstanding when in bloom during late spring. In this issue of ARNOLDIA, some of the interesting points about the varieties will be noted, as they have been observed growing in the Arboretum collection during the past ten years.

However, it must be admitted at the beginning, that except for standard recommendations, there are no magical ways of making certain vines bloom. Many articles have been written dealing with the culture of these vines, and it is not the object here to enter into a minute discussion of this topic. Suffice it to say, that all vines should bloom, some just won't—at least it may take them ten to fifteen years to produce their first flowers. It is inadvisable to grow plants from seed. They had best be propagated asexually from plants known to flower early. Grafted plants of one variety, *Wisteria* "Issai," are known to flower when very young, often at three years. This has happened with a vine here, but all too frequently valued specimens of other varieties do not bloom for a long time. Then the standard recommendations are to root prune, to prune the vigorous growing young shoots, and sometimes to give a feeding of superphosphate. These things have been known to help plants bloom, but sometimes even these do not seem to help. Experiments have been started at the Arboretum which may throw some light on the best procedure, but until these have had sufficient time to produce

* Spelling follows that of Alfred Rehder in his "Manual of Cultivated Trees and Shrubs" and Liberty Hyde Bailey in his "Hortus Second."

results, the old standard recommendations of top and root pruning, and feeding with superphosphate are best to follow.

There is even a controversy on which soils seem best—that is in aiding flower production. Planted in a light sandy soil, the plants may grow less vigorously, but tend to produce flowers sooner than when grown in a rich soil where vegetative growth is pronounced. However, E. H. Wilson, who studied this group thoroughly in Japan, made the observation that the larger, better flowering vines were those frequently planted by ponds where they had an unlimited water supply.

Introduction

There are about nine species of wisterias in North America and eastern Asia, six of which are growing in the Arnold Arboretum. Of these, three are natives of eastern Asia, two of the eastern United States, and one—the hybrid species *W. formosa*—is a cross between *W. sinensis* and *W. floribunda*. The Chinese (*W. sinensis*) and Japanese (*W. floribunda*) wisterias, have far outstripped the others in popular acclaim, at least in northern gardens, because of their profuse bloom, their large flower clusters and their varieties of varying colors and fragrance. Varieties are available with flower clusters from 6" to 48" in length, pink, white or varying shades of lilac, single or double flowers, some of which are very fragrant. The double-flowered varieties make poor ornamentals because their bloom is erratic and the double flowers quickly decay in wet weather. *Wisteria frutescens*, native on the east coast from Virginia to Florida and Texas, is not a strong vine and has not bloomed with us in recent years. *Wisteria macrostachya* is perfectly hardy, but blooms late, after the leaves are developed so that blooms are considerably hidden by the foliage. *Wisteria venusta* has poor flowers when compared with its two Asiatic relatives. *Wisteria formosa* might be considered even a better ornamental than *W. sinensis* because it is deliciously fragrant.

The longest flower cluster I have measured in the collection at the Arboretum was one 36" long, but E. H. Wilson has measured them up to 64" long on well-grown specimens in Japan. Soil, moisture, and general culture all enter into the picture as far as length of bloom is concerned. The point is that there are some varieties which, if given optimum growing conditions, will produce flower clusters 3 to 4 feet long in this country.

The genus was named in honor of Dr. Caspar Wistar (1761–1818) Professor of Anatomy at the University of Pennsylvania. The first species named was *W. frutescens*, a native of the southeastern United States from Virginia to Florida and Texas. About the same time seeds of *W. sinensis* were first sent to England where they were grown and it was not long before some reached this country. The Japanese wisteria (*Wisteria floribunda*) was first sent to the old Parson's Nursery at Flushing, Long Island, by Dr. George R. Hall, whom we have to thank for several of our very best ornamentals. This was done in 1862. *Wisteria formosa* was named from a plant growing on the Sargent estate in Brookline, Massachu-

setts, about 1905. *Wisteria floribunda violacea plena* first flowered in the garden of Francis Parkman of Jamaica Plain, Massachusetts, before 1875. The original *W. floribunda rosea*, in this country at least, was probably that found in a garden owned by a Japanese years ago in California. The entire place was bought by the late Mr. Henry S. Huntington of San Marino, California, primarily to preserve this beautiful vine. The Arnold Arboretum received scions from this plant in 1917. Later, further exploration and the growing of many seeds in this country have resulted in other varieties. If seeds are sown of *W. sinensis*, the resulting plants will not vary much, but seedlings of *W. floribunda* (formerly *W. multijuga*) vary considerably, both as to flower color and flower size.

Some plants like the huge "Rosecraft" wisteria at Point Loma, California, or the excellent plant so carefully tended for many years by Miss Mary P. Barnes of Hingham, Massachusetts, or the huge *W. sinensis* growing in the little town of Sierra Madre, California have created wide interest because of tremendous size and profuse bloom. These have grown to such proportions that they cover hundreds of square feet, and undoubtedly have been propagated. Some may have been given varietal names. So, today, there are many wisterias in this country, but there is much that they have in common. Only the better varieties should be grown.

"Tree" or "Standard" wisterias are merely vines which have been staked rigidly upright and then the tops heavily pruned for years, thus forcing the stem to grow in trunk-like proportions. In the South, wisteria vines are allowed to ramble into the tops of the tallest trees, but it should always be kept in mind that they are twining vines and can kill trees and shrubs on which they climb by strangulation.

In certain parts of China, the natives consider the flowers of *W. sinensis* quite a delicacy. The flowers are collected when in full bloom and shipped to areas of wealth where they bring premium prices. They are steamed and eaten. Flowers of the more fragrant Japanese species are not so valued, for in these the flower odor is very strong and is a continual reminder that they are flowers after all! Flowers of *Robinia* species are also cooked and eaten this way.

The Chinese wisteria is not quite as hardy as the Japanese (*W. floribunda*). During very cold winters, the flower buds of both may be killed. Some gardeners in the northern states and southern Canada like wisterias so much that they are willing to take the pains of laying the vines on the ground each fall and covering them with soil to protect the flower buds from too low temperatures. This is a considerable effort, since the main stem of the wisteria becomes very woody and more or less rigid as it grows older, making the vine much more difficult to handle in this way than rambler roses.

Twining

It is of considerable interest to note that the wisterias can be sharply divided into two groups by the way they twine. Some vines climb by twining from left



PLATE IV

Left: *Wisteria sinensis*. Right: *Wisteria floribunda macrobotrys* which bloomed at the Arnold Arboretum in 1948 with flower clusters 36'' long. The blooms on this same plant in 1949 were profuse, practically all of them being only 24'' long.

to right, others twine by climbing from right to left (ARNOLDIA, Series 4, Vol. VII, No. 7, June 23, 1939). The two native species, *frutescens* and *macrostachya* and the Chinese wisteria, *sinensis*, twine by climbing from left to right. The other three species in the Arboretum (*floribunda*, *formosa*, *venusta*) all twine by climbing from right to left. As one looks at a plant which is naturally growing around some upright object, if it starts on the lower left side of the rigid object, and grows or twines upward towards the right side, it belongs to one group, if the reverse is true, then the other.

This is most helpful, not only in training the vine properly, but also in identifying it. Of all the Japanese varieties checked in this respect, several plants of each, none showed any variation from twining by climbing from right to left. The varieties "Issai" and "Mrs. McCullagh," it has been noted by others, are not true *W. floribunda* types (they twine by climbing from left to right) but are probably hybrids of *W. sinensis*.

Identification

Since most wisterias in northern gardens at least are either varieties of *W. sinensis* or *W. floribunda*, distinguishing characteristics between them are needed. The following points might be helpful.

	<i>Wisteria sinensis</i>	<i>Wisteria floribunda</i>
Length of flower cluster	6 to 12"	8 to 48"
Fragrance of flowers	not fragrant	fragrant
Leaflets	7 to 13, large	13 to 19, small
Autumn color	none	yellow
Time flowers appear	before leaves appear	with the leaves
Twines by climbing from	left to right	right to left

The following key is offered merely as a help in identification. It is always best to consult a standard botanical reference with complete keys when positive identification is necessary. It should be pointed out that the native wisterias (*frutescens* and *macrostachya*) and *W. venusta* do not appear often in northern gardens as they are not among the better ornamental types. *Wisteria formosa* may appear, for it is a hybrid and a very beautiful one, too. The flowers appear similar to its Chinese parent, the fragrance and twining are similar to its Japanese parent. The plant in the Arboretum came from the old Sargent Estate in Brookline. It might well be the other clones of this cross might show other characteristics.

Wisteria species

Vine twines by climbing from left to right

Flower clusters 2 to 5" long *W. frutescens*

Flower clusters 6 to 14" long

Leaflets usually about 9 *W. macrostachya*

Leaflets 7 to 13 *W. sinensis*

Vine twines by climbing from right to left

Flower clusters 4 to 6" long *W. venusta*

Flower clusters 8 to 48" long

Leaflets 13 to 19, flowers open progressively downwards *W. floribunda*

Leaflets 7 to 15, flowers open all together *W. formosa*

Order of Bloom

The wisterias in the Arnold Arboretum bloom throughout a four-to-five-week period, starting with *W. venusta*, the earliest, and ending with *W. macrostachya*, which blooms after the others have all faded. In fact it blooms after the leaves are out so that they frequently hide the pale bluish blossoms. *W. frutescens* has not been recorded as blooming recently in the Arnold Arboretum, but it probably blooms after *W. macrostachya*. The order in which they bloomed in 1949 (the season was 10 to 14 days advanced) was as follows:

Order of Bloom

Full bloom 5/6/49

Past bloom 5/13/49

W. venusta and varieties

Full bloom 5/13/49

Full - Past bloom 5/20/49

W. floribunda macrobotrys

W. formosa

W. sinensis and varieties

Full bloom 5/20/49

Past bloom 5/25/49

W. floribunda and varieties

Starting to full bloom 6/1/49

W. macrostachya (blooms when others are past)

Best for Fragrance

The varieties noted for their delicious fragrance belong mostly to the species *W. floribunda* or its hybrid, *W. formosa*. The true Chinese wisteria has no fragrance, but it may well be that there are many vines passing in gardens as *W. sinensis* that are actually hybrids (i.e., *W. formosa*). *Wisteria venusta* is only slightly fragrant. The best of all the varieties in the Arboretum for fragrance might be:

W. floribunda "Kuchi Beni"

" " "Longissima alba"

" " *macrobotrys*

" " "Naga Noda"

" " *rosea*

" *formosa*

" *sinensis* "Jako" (possibly a hybrid)

Length of Clusters

The length of the clusters varies with the species, variety and growing conditions. *Wisteria frutescens* has the shortest clusters, about 2 to 5'' long, thus eliminating it as a desirable ornamental. *Wisteria floribunda* has the longest, some of its varieties having clusters 36'' long in the Arboretum, and most of them 12 to 24''. E. H. Wilson measured clusters of *W. floribunda macrostachya* in Japan as much as 64'' long, grown under ideal conditions. This was on a huge vine growing on a bamboo trellis covering one sixth of an acre. However, this length of cluster can vary on the individual plant. For instance, one plant at the Case Estates in Weston last year had only a dozen or so clusters, but some measured 36'' long. This year this same plant produced a large number of clusters, most of which were about 24'' in length. The variety "Kyushaku" has clusters 4 to 5' long when grown properly in this country, according to the former A. E. Wohler of Narbeth, Pennsylvania, who used to specialize in these plants. It must be admitted that the one flower cluster on our plant of this variety measured only 26'' this year, the first time it has bloomed. Consequently, length of cluster will vary with weather and growing conditions. The following modest measurements were taken in the Arboretum collections during the past five years:

Length of Cluster

3 to 5'' long

W. venusta and vars.

6 to 12'' long

W. floribunda

" *alba*

" *carnea*

" "Geisha"

" "Murasaki Noda"

" "Russelliana"

" "Sekine's Blue"

" "Shiro Noda"

W. floribunda "Ushi Jima"

" *violacea plena*

W. macrostachya

" "Mrs. McCullagh"

" *sinensis*

" " "Jako"

" " "Sierra Madre"

13 to 18'' long

W. floribunda "Beni Fugi"

" " "Kuchi Beni"

" " "Longissima alba"

W. floribunda rosea

" " "Royal Purple"

" *formosa*

20'' long and more

W. floribunda "Kyushaku" 26''

" " *macrobotrys* 36''

W. floribunda "Naga Noda" 24''

It should be emphasized again, however, that these measurements are only for these plants growing on one type of soil. Mr. W. B. Clarke of San Jose, Cali-

fornia, who grows many wisterias says that *W. floribunda* "Longissima" will grow 3 to 4' with him. Possibly others will do similarly better if given more suitable growing conditions. The variety "Shiro Noda" has been recorded as having clusters 30" long in this country, but has not yet performed this way in our collection.

Flower Colors

The wisterias can be classified or selected because of four general traits, namely, color, fragrance, time of bloom and length of bloom. Consequently one can not eliminate varieties merely by color alone. It might be far more satisfactory to buy a variety known to produce flowers early, regardless of color or size of bloom, rather than to wait years for the plant to produce its first flowers. However, there are certainly not thirty or forty different varieties of wisterias worthy of being grown and widely planted in this country. The following varieties are grouped in their respective color groups, together with notes about them, merely as an aid for those who wish to make their own selections. Colors are those of the English "Horticultural Colour Chart." The number of leaflets on the leaves of the plants vary of course and should not be used as a means of distinguishing one variety from another, but the number given is the number normally on well-grown leaves on the plants in our collections in 1949.

Also the length of flower cluster varies on the same plant and from year to year. For instance, clusters of "Ushijima" were only 6" long in 1944, but 13" long by 1946 on the same plant. Consequently all these figures are given merely as a matter of record. Apparently the flower clusters of a certain variety will become better and longer as the plant becomes better and better established.

Selections of the better varieties as they have performed up to this time in the Arnold Arboretum are listed with an asterisk (*) but undoubtedly there is ample opportunity for further testing in this interesting group.

Flowers White

**Wisteria floribunda alba*: Clusters 10 to 11" long; moderate fragrance; cluster dense; leaflets thirteen.

Wisteria floribunda "Kuehi Beni": Cluster 12" long; good fragrance; color not a pure white, but slightly pinkish, giving a slight faded appearance; leaflets fifteen.

Wisteria floribunda "Longissima alba": Clusters 14" long; good fragrance, supposedly a sport of the violet-colored "Longissima"; leaflets thirteen.

Wisteria floribunda "Shiro Noda": Clusters 8" long; moderate fragrance; leaflets fifteen; has been listed in catalogues with flowers 24 to 30" long.

Wisteria sinensis alba: The true vine has not bloomed recently in the Arboretum, but should be similar to *W. sinensis* except in color.

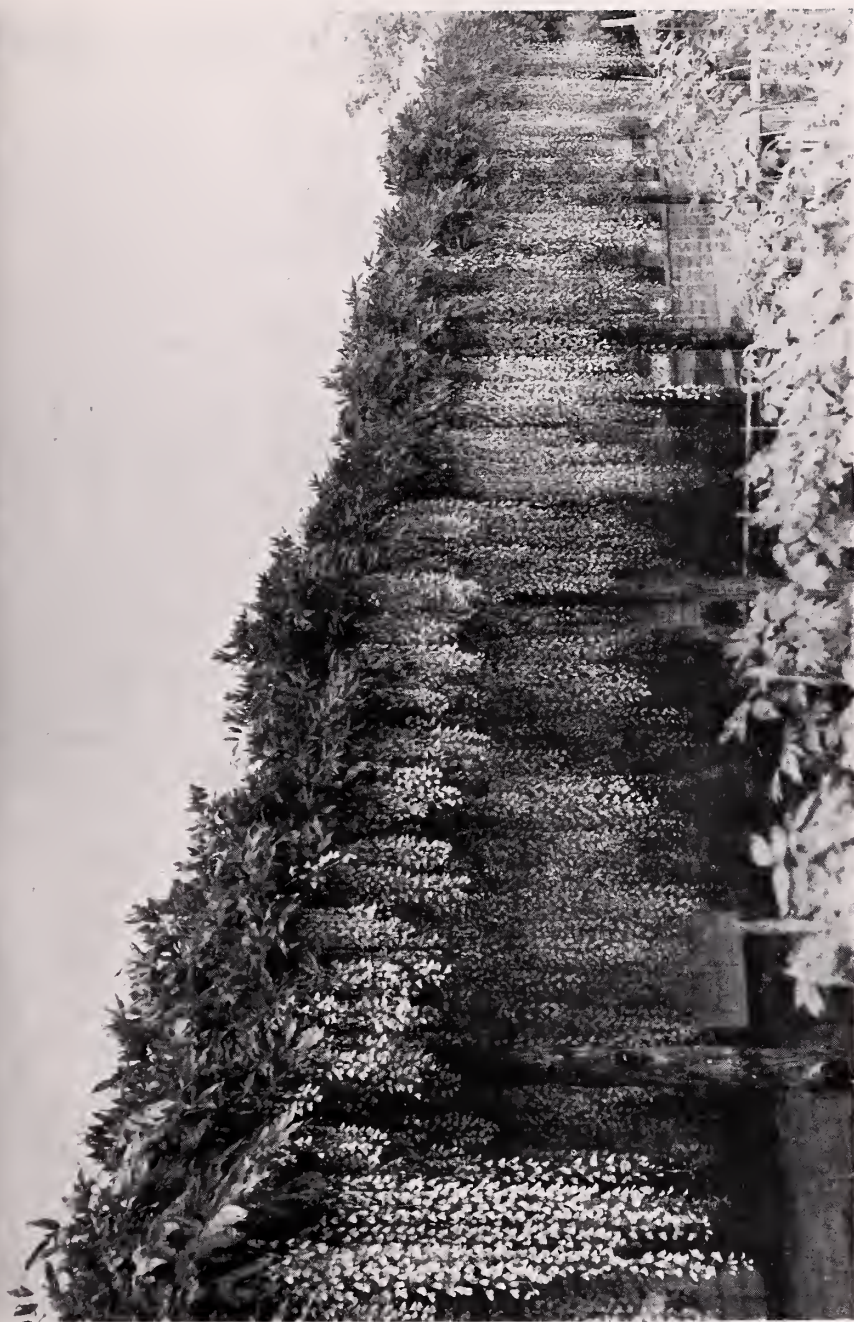


PLATE V

Wisteria floribunda macrobotrys photographed by E. H. Wilson in 1914 in a garden near
Tokyo, Japan, with largest flower clusters 50 to 60" long.

**Wisteria sinensis* "Jako": Clusters 11" long; dense; leaflets eleven; excellent fragrance—very probably a hybrid of *W. sinensis* because of its excellent fragrance. This is probably in the trade as *W. sinensis alba*, but is a much more desirable plant.

Wisteria venusta: Clusters 3" long; very little fragrance; thin open clusters; 9 to 13 leaflets; poor ornamental, There is supposed to be a form with double white flowers, but all plants we have received under the name *W. venusta plena* have turned out to be *W. floribunda violacea plena*.

Flowers Pink

Wisteria floribunda carnea: Clusters 9 to 10"; moderate fragrance; 13 to 15 leaflets; a flesh pink. Our plant has only had a few clusters this year, but these did not vary too much from those of the variety *rosea*. This was first imported to this country by W. B. Clarke of San Jose, California, in 1931 from Japan under name of *W. sinensis rubra*. When it bloomed it was found to be a *W. floribunda* type and not red but flesh pink—hence the name was changed. It is said to have a very strong fragrance.

**Wisteria floribunda rosea*: Clusters 15" long; excellent fragrance; leaflets fifteen; color—Amaranth rose 530.

Flowers Light Reddish Violet to Violet

Wisteria floribunda: Clusters 18 to 20"; moderate fragrance; fifteen leaflets; standard of flower whitish; keel and wings cobalt violet 634/2. These colors vary widely when plants are grown from seed. Flowers open progressively from base of cluster to the end at the same time the leaves appear.

Wisteria floribunda "Beni Fugi": Clusters 12 to 14" long; fragrance fair; leaflets nineteen; only one blossom on vine in 1949.

Wisteria floribunda "Kyushaku": Clusters 26"; fragrance fair; identical in color with *macrobotrys*. This plant first bloomed this year with only one flower cluster. It may well be that this variety and *W. floribunda macrobotrys* are identical. "Kyushaku" was first offered by A. E. Wohlert of "The Garden Nurseries" in Narbeth, Pa., shortly before 1935 as the "ultimate" in length of wisteria flowers, but the botanical variety *macrobotrys* of Rehder and Wilson probably covers such clones.

Wisteria floribunda "Longissima": This has not yet bloomed in our collections, but was planted in 1938. Some nurserymen have given this name to selected seedlings so plants with this name are probably not identical.

**Wisteria floribunda macrobotrys*: Clusters 18 to 36" long and longer; fragrance excellent; standard of flower cobalt violet 634/3, keel and wings cobalt violet 634; supposedly the variety with the longest flower clusters.

- **Wisteria floribunda* "Murasaki Noda": Clusters 10'' long; fragrance fair; leaflets fifteen; identical with *macrobotrys* except that the standard of the flower is larger and slightly lighter.
- **Wisteria floribunda* "Naga Noda": Clusters 18''; fragrance excellent; leaflets 17; standard of flower bishop's violet 34/1; keel and wings bishop's violet 34/3.
- Wisteria floribunda* "Royal Purple": Clusters 12 to 14''; fragrance fair; leaflets fifteen; standard mineral violet 635/1; keel and wings mineral violet 635/2; first offered in 1937 by W. B. Clarke of San Jose, California.
- Wisteria floribunda* "Russelliana": Clusters 8''; little fragrance; leaflets fifteen; standard of flower almost white; wings and keel mineral violet 635.
- Wisteria floribunda violacea plena*: Clusters 10 to 12''; fragrance fair; leaflets thirteen; flowers double of varying shades of reddish violet. Not an ornamental variety since the plants produce few flowers and they rot quickly in wet weather.
- Wisteria floribunda* "Ushi Jima": Clusters 13''; fragrance poor; leaflets fifteen; flower standard white and violet 36/2; wings and keel violet 635.
- Wisteria frutescens*: Flowers 2 to 4½''; leaflets eleven; listed as having "lilac purple" flowers but has not bloomed in the Arboretum during recent years.
- Wisteria macrostachya*: Clusters 12''; leaflets eleven; blooms after all other types (except *W. frutescens*) have passed.

Flowers Violet to Bluish Violet

- Wisteria floribunda* "Geisha": Clusters 12'' long; moderate fragrance; leaflets thirteen; flower standard whitish; wings and keels sea lavender violet 637/1.
- Wisteria floribunda* "Sekine's Blue": Clusters 7'' long; little fragrance; leaflets seventeen; standard whitish; wings and keel sea lavender violet 637/2.
- **Wisteria* "Issai": Clusters 12''; moderate fragrance; leaflets seventeen; flowers "Blue-purple" according to W. B. Clarke, but it has not bloomed for several years in the Arboretum. Probably a hybrid form because it twines by climbing from left to right and also from right to left.
- **Wisteria formosa*: Clusters 12''; fragrance excellent; leaflets thirteen; a hybrid (*floribunda* × *sinensis*) twining by climbing from right to left but all the flowers opening at once; flower standard campanula violet 37/3; wings and keel campanula violet 37/1. It is probable that many so-called Chinese wisterias being grown in gardens today are actually *W. formosa*.
- Wisteria* "Mrs. McCullagh": Clusters 6''; moderate fragrance; color only noted as "bluish violet." It is less vigorous than the others, not a good type.

**Wisteria sinensis*: Clusters 8'' long; not fragrant; leaflets eleven; flower standard methyl violet 39/3; wings and keel violet 36/1; twines by climbing from left to right; the standards of individual flowers are larger than those of *W. floribunda* types (*floribunda* 11/16'' \times 5/8''; *sinensis* 1'' \times 3/4'') and all the flowers open together before the leaves appear.

Wisteria sinensis "Sierra Madre"; Clusters 8''; excellent fragrance, leaflets thirteen; flower standard whitish; wings and keel sea lavender violet 637/1 merely propagated from a large vine at Sierra Madre, California, that has been given wide publicity. This may be a hybrid.

**Wisteria venusta violacea*: Clusters 6''; fragrance good; leaflets thirteen; flower standard whitish; wings and keel methyl violet 39/2. A good variety. Mr. W. B. Clarke says that older plants, especially grown in standard form, have an overwhelming profusion of bloom that is better than any form of *W. sinensis*.

DONALD WYMAN

ARNOLDIA



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FLOWER COLORS OF HARDY HYBRID RHODODENDRONS

THE hybrid broad-leaved evergreen rhododendrons are most conspicuous during early June. If grown in fertile, acid soil, mulched properly and pruned properly (see ARNOLDIA, Vol. 8, No. 8, September, 1948) they should produce a bright display of flowers annually. The collection in the Arnold Arboretum is over fifty years old and has been added to continually from year to year. Rhododendron enthusiasts are continually studying this collection, noting the differences between the many varieties now being grown. Not all that are available in the eastern United States nurseries are here, but many are, and it serves a valuable purpose, at the same time making a splendid display.

It is most difficult to properly identify the many hardy rhododendron hybrids. The species are of course keyed out in standard botanical keys, but there is little easily available information about the identification of hybrids grown in the East. There are no colored pictures or paintings sufficiently accurate for this purpose, nor are there suitable descriptions of the flower colors. Articles for popular periodicals are numerous, but color descriptions in these are entirely too general. The term "crimson flowers" may cover a dozen or more varieties, each one of which does differ slightly from the others. Size of truss, of flower, markings on corolla and even the color of the stamens and pistils are all aides in identification.

Consequently, we have started an attempt at the proper description of hybrid varieties, growing in our collection, by the careful comparison of colors of the flowers as they bloomed this year, with the colors of the Royal Horticultural Society's Colour Chart. This has its drawbacks, as anyone familiar with plants is quick to point out. In the first place, the color of the flowers varies slightly depending on whether they open in shade or full sun. The size of the flower varies according to the amount of nourishment the roots are able to receive. Flowers quickly fade in full sunlight — this and many other criticisms can be justly leveled at any such comparison.

However, an attempt is here made to enumerate the respective characteristics of the rhododendron hybrids as they performed with us this year, all growing in the same soil together, under the same conditions. Readings and comparisons were made from a representative flower truss in full bloom. Even with the weaknesses of this method, the resulting information is valuable. It aids materially in pointing out the fact that there are many varieties being grown, several of which will give the same landscape effect. True, there may be slight differences in color or size of corolla or flower truss, or the markings or the colors of the pistil and stamens may differ slightly, affording reason for different varietal names, but when some 50 named varieties are brought together in a single room for comparison, similarities are striking and should be emphasized.

Judging them from the viewpoint of their **serviceability in the landscape**, there are many which are **practically identical**. This is important. There is a slight variation in time of bloom; some come earlier than others, and the trusses of some are more dense and larger than others—reasons why certain growers prefer some rather than others. The following list, it is hoped, is only a start at the time-consuming task of comparing all the varieties grown in the East. Whether or not this means of identification has merit can best be judged by each individual rhododendron enthusiast. Comments on this method of approach and the measurements given for these varieties will be greatly appreciated.

Flower Colors of Hardy Hybrid Rhododendrons

Group I White (General landscape effect)

Rhododendron caucasicum coriaceum pure white

Truss: $3\frac{1}{2}$ " high and 5" wide; loose, rounded

12 flowers in truss; flower diameter $2\frac{1}{2}$ "

Markings inside corolla: Chartreuse green (663/1)

Style and stigma reddish;* base of corolla outside pale reddish; blooms early

Rhododendron "Boule de Neige" pure white

Truss: 4" high and 6" wide; compact, rounded

14 flowers in truss; flower diameter $2\frac{3}{4}$ "

Markings inside corolla: Chartreuse green (663/1)

Edge of petals slightly frilled;** plant blooms early.

Rhododendron "Baroness Henry Schroeder" white

Truss: 3" high and $5\frac{1}{2}$ " wide; loose, rounded

14 flowers in truss; flower diameter $2\frac{3}{4}$ "

Markings inside corolla: Cyclamen purple (30/1)

Plant blooms early.

*Pistils and stamens are whitish unless otherwise noted.

**Petal margins not frilled unless otherwise indicated.

Group II Pale Blush Pink to Whitish

Rhododendron "Album elegans" Dawn pink (523/3) fading white in center

Truss: 5'' high and 6'' wide; dense, pyramidal

18 flowers in truss; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: Primrose yellow (601/2)

Stigma red, style pink.

Rhododendron "Sultana" Dawn pink (523/3) fading to white

Truss: 4'' high and 6'' wide; dense, pyramidal

12 flowers in truss; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: Majolica yellow (609/1) pronounced

Anthers purplish; blooms last of all those listed here.

Rhododendron calawbiense album Neyron rose (623/3) to whitish

Truss: $4\frac{1}{2}$ '' high and 6'' wide; dense, pyramidal

20 flowers in truss; flower diameter $2\frac{1}{4}$ ''

Markings inside corolla: Primrose yellow (601/1) very faint and few.

Rhododendron "Album grandiflorum" Neyron rose (623/3) to whitish

Truss: 4'' high and 5'' wide; dense, pyramidal

18 flowers in truss; flower diameter $2\frac{3}{4}$ ''

Markings inside corolla: greenish yellow (64/2) few and inconspicuous

Stigma red, margins of petals slightly frilled.

Rhododendron "Delicatissimum" Rose madder (23/3) fading to white at center

Truss: 4'' high and 5'' wide; loose-dense, rounded

14 flowers in truss; flowers $2\frac{1}{4}$ '' diameter

Markings inside corolla: Greenish yellow (64/1) pronounced

Stigma red. This truss is similar to but not as good as "Album grandiflorum."

Rhododendron "Albert" Rose madder (23/3) center whitish

Truss: $3\frac{1}{2}$ '' high and 6'' wide; dense, round

16 flowers in truss; flower diameter 3''

Markings inside corolla: brownish

Rhododendron "Candidissimum" Rose madder (23/3)

Truss: 4'' high and 6'' wide; dense, rounded

12 flowers in truss; flower diameter $2\frac{3}{4}$ ''

Markings inside corolla: Citron green (763/3) few and inconspicuous

Rhododendron watereri Rose pink (427/1)

Truss: 5'' high and 6'' wide; dense, pyramidal

20 flowers in truss; flower diameter $2\frac{3}{4}$ ''

Markings inside corolla: brownish

Group III Pale Pink (General landscape effect)

Rhododendron "Anton" Roseine purple (629/2) fairly uniform

Truss: $4\frac{1}{2}$ '' high and 6'' wide; dense, pyramidal

18 flowers in truss; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: greenish to brownish

Stamens and pistil pinkish; petals slightly frilled.

Rhododendron "Bella"

Amaranth rose (530/2) uniform

Truss: 3'' high and 5'' wide; dense, rounded

14 flowers in truss; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: Yellow ochre (o7)

Stamens and pistils pinkish; petal margins frilled.

Rhododendron "Duke of York"

Amaranth rose (530/1) to whitish

Truss: $5\frac{1}{2}$ '' high and 7'' wide; loose, rounded

12 flowers in truss; flower diameter $3\frac{1}{2}$ ''

Markings inside corolla: Uranium green (63/2)

7 petals in corolla; color at tip of petals only.

Rhododendron "President Lincoln"

Phlox purple (632/3) uniform

Truss: $4\frac{1}{2}$ '' high and 5'' wide; dense, rounded

26 flowers in truss; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: brownish

Stamens and pistil pinkish.

Rhododendron "Arno"

Rose purple (533/1) to white in center

Truss: 4'' high and 6'' wide; dense, pyramidal

26 flowers in cluster; flower diameter $2\frac{1}{2}$ ''

Markings inside corolla: Dahlia purple (931) prominent

Pink to Deep Pink (General landscape effect)

Rhododendron "Lady Armstrong"

Solferino purple (26/2)

Truss: 5'' high and $5\frac{1}{2}$ '' wide; dense, pyramidal

24 flowers in truss; flowers $2\frac{3}{4}$ '' diameter

Markings inside corolla: Ruby red (827/3) few

Stigma red; style and stamens pinkish near tip.

Rhododendron "Henrietta Sargent"

Fuchsine pink (627/1)

Truss: 4'' high and 6'' wide; dense, rounded

14 flowers in truss; flowers $2\frac{3}{4}$ '' diameter

Markings inside corolla: brown to greenish

Stigma red; styles and stamens pink.

Rhododendron "James Bateman"

Fuchsine pink (627/1)

Truss: 4'' high and 6'' wide; dense, rounded

18 flowers in cluster; flowers $3\frac{1}{4}$ '' diameter

Markings inside corolla: Dahlia purple (931)

Stigma red; Style and stamens Fuchsine pink

Rhododendron "Flushing"

Magenta (27/1)

Truss: 4'' high and 6'' wide; dense, rounded

18 flowers in truss; flowers $2\frac{3}{4}$ '' diameter

Markings inside corolla: Dahlia purple (931)

Stigma and style red; stamens purplish

- Rhododendron* "Daisy" Magenta (27/1)
 Truss: 3" high and 4½" wide; dense, rounded
 16 flowers in truss; flowers 2½" diameter
 Markings inside corolla: Barium yellow (503)
 Stigma red; style and stamens pinkish. Blooms early. Petals slightly frilled.
- Rhododendron* "Ignatius Sargent" Tyrian purple (727/2)
 Truss: 3½" high and 5" wide; dense, rounded
 14 flowers in truss; flowers 3" diameter
 Markings inside corolla: brownish, pronounced
 Stigma nearly black, styles red, stamens pale pink, petals slightly frilled on margin.
- Rhododendron* "Desiderius" Persian rose (628/1)
 Flowers 2¼" diameter
 Markings inside corolla: Uranium green (63/2)
 Stigma red; style and stamens pink; blooms early.
- Rhododendron* "Alarich" Fuschia purple (28/1)
 Truss: 3½" high and 5" wide; dense, rounded
 20 flowers in truss; flowers 2¼" diameter
 Markings inside corolla: Dahlia purple (931) few, pronounced
 Stigma nearly black; style and stamens purplish.
- Rhododendron* "Caractacus" Fuschia purple (28/1)
 Truss: 4" high and 5" wide; dense, rounded
 18 flowers in truss; flowers 3" diameter
 Markings inside corolla: Citron green (763) not conspicuous
 Pistil and stamens red.
- Rhododendron* "General Grant" Fuschia purple (28/1)
 Truss: 3" high and 4½" wide; dense, rounded
 14 flowers in truss; flowers 2¼" diameter
 Markings inside corolla: Garnet lake (828) few
 Stigma nearly black; stamens Fuchsia purple; style lighter.
- Rhododendron* "Kettledrum" Roseine purple (629)
 Truss: 3" high and 4½" wide; dense, rounded
 14 flowers in truss; flowers 3" diameter
 Markings inside corolla: Citron green (763)
 Pistil and stamens reddish.
- Rhododendron* "Adelbert" Roseine purple (629) uniform
 Truss: 4" high and 5½" wide; dense, rounded
 22 flowers in truss; flowers 3" diameter
 Markings inside corolla: Dahlia purple (931) pronounced
 Pistil and stamens pinkish; margin of petals slightly frilled; almost identical with "Echse" except for color of stamens and pistil.

- Rhododendron* "Echse" Roseine purple (629) uniform
 Truss: 5'' high and $5\frac{1}{2}$ '' wide; dense, pyramidal
 18 flowers in truss; flowers $2\frac{3}{4}$ '' diameter
 Markings inside corolla: Dahlia purple (931) pronounced
 Stigma deep red, style and stamens white; margins of petals slightly frilled.
- Rhododendron* "Hannah Felix" Roseine purple (629)
 Truss: 3'' high and $4\frac{1}{2}$ '' wide; dense, rounded
 20 flowers in truss; flowers $2\frac{3}{4}$ '' diameter
 Markings inside corolla: Beetroot purple (830/1) pronounced
 Stigma red; style and stamens reddish; blooms early; color of flowers almost uniform except under corolla markings, where it is whitish.
- Rhododendron* "Bicolor" Roseine purple (629/1)
 Truss: 4'' high and $5\frac{1}{2}$ '' wide; dense, rounded
 22 flowers in truss; flower diameter $2\frac{1}{2}$ ''
 Markings inside corolla: Pansy purple (928/3)
 Stamens and pistil pink.
- Rhododendron* "Mrs. C. S. Sargent" Roseine purple (629/1)
 Truss: $4\frac{1}{2}$ '' high and 6'' wide; dense, rounded
 17 flowers in truss; flowers $3\frac{1}{4}$ '' diameter
 Markings inside corolla: Greenish
 Pistil and stamens Roseine purple; petal margins frilled.
- Rhododendron* "Eva" Roseine purple (629/2)
 Truss: 4'' high and 5'' wide; dense, rounded
 22 flowers in truss; flower diameter 3''
 Markings inside corolla: Citron green (763)
 Stigma red; style and stamens pink; edge of petals frilled.
- Rhododendron* "Everestianum" Roseine purple (629/2)
 Truss: $4\frac{1}{2}$ '' high and 6'' wide; dense, pyramidal
 18 flowers in cluster; flowers $2\frac{1}{2}$ '' diameter
 Markings inside corolla: Greenish to brown
 Pistil and stamens pinkish; petal margins slightly frilled.
- Rhododendron* "Mrs. Milner" Rhodamine purple (29/1)
 Truss: 4'' high and 5'' wide; dense, pyramidal
 16 flowers in truss; flowers $2\frac{1}{2}$ '' wide
 Markings inside corolla: Dahlia purple (931)
 Stigma black; style and stamens Rhodamine purple.
- Rhododendron* "Parson Goff" Rhodamine purple (29/2)
 Truss: 5'' high and 5'' wide; dense, pyramidal
 25 flowers in truss; flowers $2\frac{3}{4}$ '' diameter
 Markings inside corolla: Chartreuse green (663) few
 Stigma black; style red; stamens Rhodamine purple.



Rhododendron Collection in flower at the base of Hemlock Hill.

Rhododendron "Roseum elegans" Rhodamine purple (29/2)

Truss: 4" high and $5\frac{1}{2}$ " wide; dense, slightly pyramidal

20 flowers in truss; flower diameter 3"

Markings inside corolla; Chartreuse green (663) few

Markings not pronounced; center of flower white.

Rhododendron "Fee" Cyclamen purple (30/2)

Truss: $3\frac{1}{2}$ " high and $4\frac{1}{2}$ " wide; dense, rounded

20 flowers in truss; flower diameter $2\frac{1}{2}$ "

Markings inside corolla: Pansy purple (928) pronounced

Stamens and pistil reddish.

Group V Red to Reddish (General landscape effect)

Rhododendron "Charles Dickens" Spiraea red (025)

Truss: 4" high and 5" wide; loose-dense, rounded

16 flowers in truss: flowers $2\frac{1}{4}$ " diameter

Markings inside corolla: Dahlia purple (931)

Pistils and stamens Spiraea red.

Rhododendron "Charles Bagley" Fuchsine pink (627)

Truss: 5" high and $5\frac{1}{2}$ " wide; dense, pyramidal

18 flowers in truss; flowers 3" diameter

Markings inside corolla: Citron green (763)

Stamens and pistils pink.

Rhododendron "Norma" Fuchsia purple (28)

Truss: 4" high and 5" wide; dense, rounded

18 flowers in truss; flowers $2\frac{3}{4}$ " diameter

Markings inside corolla: Greenish

Stamens and pistil purplish; blooms early.

Rhododendron "Daisy Rand" Rhodamine purple (29/1)

Truss: 3" high and $4\frac{1}{2}$ " wide; dense, rounded

15 flowers in truss; flowers $2\frac{1}{2}$ " diameter

Markings inside corolla: Dahlia purple (931) few

Stigma black; style whitish; stamens purplish.

Rhododendron "James MacIntosh" Rhodamine purple (29/1)

Truss: 4" high and 5" wide; semi-dense, rounded

17 flowers in truss; flower $2\frac{3}{4}$ " diameter

Markings inside corolla: Dahlia purple (931)

Stamens and pistil Rhodamine purple.

Rhododendron "Atrosanguineum" Peony purple (729/2)

Truss: $2\frac{1}{2}$ " high and $4\frac{1}{2}$ " wide; loose, rounded

14 flowers in truss; flowers $2\frac{3}{4}$ " diameter

Markings inside corolla: Dahlia purple (931)

Stamens and pistil Peony purple; blooms early.

Rhododendron "H. W. Sargent" Peony purple (729/2)
 Truss: 3" high and $4\frac{1}{2}$ " wide
 14 flowers in truss; flowers $2\frac{1}{4}$ " diameter
 Markings inside corolla: Dahlia purple (931)
 Stamens and pistil Peony purple.

Group VI Purple (General landscape effect)

Rhododendron "Lee's Purple" Imperial purple (33/1)
 Truss: $4\frac{1}{2}$ " high and 6" wide; dense, rounded
 18 flowers in cluster; flower diameter $2\frac{3}{4}$ "
 Markings inside corolla: Brownish, conspicuous
 Darkest purple of any varieties in this list.
 Pistil and stamens red.

Rhododendron "Purpureum grandiflorum" Imperial purple (33/2)
 Truss: 4" high and 7" wide; dense, rounded
 16 flowers in cluster; flower diameter 3"
 Markings inside corolla: Citron green (763)
 Stamens and pistil reddish.

Rhododendron "Purpureum elegans" Amethyst violet (35/2)
 Truss: 4" high and 6" wide; dense, rounded
 16 flowers in truss; flower diameter $2\frac{3}{4}$ "
 Markings inside corolla: Citron green (763) prominent
 Pistil reddish; stamens purplish.

Rhododendron "Melton" Lilac purple (o31/1)
 Truss: $3\frac{1}{2}$ " high and 5" wide; dense, rounded
 14 flowers in truss; flower diameter $3\frac{1}{4}$ "
 Markings inside corolla: Maroon (1030)
 Stigma black; stamens and style whitish.

Rhododendron "Mrs. Harry Ingersoll" Lilac purple (o31/1)
 Truss: 4" high and 5" wide; dense, pyramidal
 14 flowers in truss; flower diameter $2\frac{1}{2}$ "
 Markings inside corolla: Citron green (763)
 Stigma whitish, stamens purplish. A whitish condition of petal underneath markings gives a unique color.

It will be noted that no varieties in this group are starred for being "the best." E. H. Wilson and many others have made such lists which may or may not be serviceable today. This issue of ARNOLDIA will have served its purpose well if it brings to the attention of all rhododendron enthusiasts the very important fact that there is a striking similarity among the colors of many of these rhododendrons. Only a comparatively few varieties need be grown for general landscape purposes.

DONALD WYMAN

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PLATE VI

Malus pumila niedzwetzkyana var.

Sewall Brown, Photographer

PETERS HILL

LONG ago when Professor Sargent was studying and determining the thorns, Peters Hill was the horticultural zoo in which the various species were assembled. An old airplane view of the hilltop, when the crataegus were young, reminds one of an old-fashioned country pincushion with pins neatly arranged in radiating lines: not a pin out of place. The thorns prospered on the hill, in spite of poor soil and lack of water—in fact they flourished so well that after twenty or more years their young seedlings sprang up among the parents and the older trees grew until they touched and their branches wove into each other. While they were in bloom and in fruit the hillsides were a beautiful sight, but the young thorns came up with such vigour that the whole area became a jungle. It was difficult to decide on a fresh start but a decision was urgent, as the trees were not only interwoven but the thickets below them were grave fire hazards. The die was cast, and most of the old trees were uprooted, leaving the hill bald and bare, with myriads of seedling thorns sprouting everywhere. A thorough cleaning thus became necessary, and the slopes looked even more defaced and tortured when strips of grass were sown in order to try and get rid of the invading shrublets which made a part of the fire hazard. Old friends of Peters Hill have shown their interest in the work of restoration done in the last year; the whole space is now being restudied and planting will begin before long. Work has started to change an overgrown and tangled slope to what may again be a typical and attractive New England upland.

In former days there were many sorts of thorns assembled in the hillside pincushion plantation and of these a considerable number were so nearly alike in horticultural value that they could wisely be discarded in a re-arrangement. The conspicuously different species will be kept in the new planting so that the layered branches of the thorns of the cockspur type will show their beauty and characteristics, and others will display their several differences of growth, time of flowering or size, colour and time of fruiting. They will be more widely separated than in the past and consequently will show their varied beauties.

The plan in the middle pages of this bulletin will show the lines on which the replanting is being considered. Like all plantations, its outlines, in order to blend with slopes and natural features will—like timetables—be subject to change without notice. The idea underlying the new treatment of the hillsides is to adapt the plantation and walk lines to the hill contours and fit them to the steep slopes. There are occasional shelves on the hill where walks can be placed with little alteration in the natural grades, therefore the plantations will follow these walks or occasionally stand free in the open.

Peters Hill is typical of many denuded and thin-soiled New England knolls, but the view from it surpasses many others, with a distant prospect of the City of Boston as well as a wide sweep of country, while the foreground is full of the

colour and interest of the main body of the Arboretum. The very top is destined to be kept for an open view with radiating vistas. The summit will be reached by grass walks, following the contours of the hill and rising by easy grades. The circumference road will remain unaltered, but opposite the Bussey Street entrance an inviting breadth of grass will lead gradually to diverging walks between the new plantations of thorns and crabapples.

There have been many new species of crabapples discovered, and still more *Malus* hybrids produced since the early days on Peters Hill. The finest of the old crabapples will be carefully preserved and the newer sorts and hybrids added to the old plantation, as plants, like people, need to have the younger generation grow up around them. The *Malus* plantation will be considerably enlarged, especially at the north and east sides of the road surrounding and climbing around the hillside. There is room for nearly double the number of crabapples of former years, and on the lower level near the railroad tracks an open space will give room for a collection of poplars, hybrids and species, which should thrive in the situation and should beneficently veil some of the railroad activities and groups of small houses beyond the lines.

Access to the plantations was not easy in the old design, as slopes were steep and brambles and vicious young thorns caught the investigator, literally by the coat-tail. The new walks will be concealed between plantations, so that, as at the start, the general aspect of the slope will show a series of groups of allied and harmonious members of the rose family.

The chief *Malus* and *Crataegus* plantations will face the visitor coming in from the Arboretum across Bussey Street and will cover the ground below the road, enlarging the present *Malus* group to the eastward and climbing up more than half the height of the hill. It is intended to have these plantations fairly narrow so that students and visitors will have easy access to both sides of any group. As the walks wind spirally around the hill, gaining height as they progress, the character of planting will change. For example, on the east side of the hill an old wood road follows a natural shelf above a moist hollow, in which alders and other plants flourish which crave more dampness than the rest of the hill can provide.

A fine grove of native trees, predominantly oaks, climbs up one side of the hill nearly to the very top. It is hardly necessary to say these will not be disturbed, because a loop of the upper walk will traverse the grove and give variety to the picture unfolded before the visitor. On coming out of the grove the bare top of the hill will show visitors the wide prospect of Arboretum, suburban settlements and a distant view of the tall buildings of Boston.

This hill top is like many hundred others in New England, dome shaped, nearly bare of vegetation and desperately poor in soil. Therefore the new plantations must take all these considerations into account, and no plants should be set out which are incapable of fighting their own battles against wind, cold and

SOUTH STREET

Poplars and Young Flowering Crabs

Old Thorn Plantation

Old Flowering Crab Plantation

Old Deciduous Trees

NEW FLOWERING CRABS

CHESTNUT COLLECTION

BUSSEY STREET

SERVICE AREA

Grass

Grass

THORNS

JACK

PINES

VESTA THORNS

NEW HYDRO MATERIAL

Grass

LOW JUNIPERS

MUGO

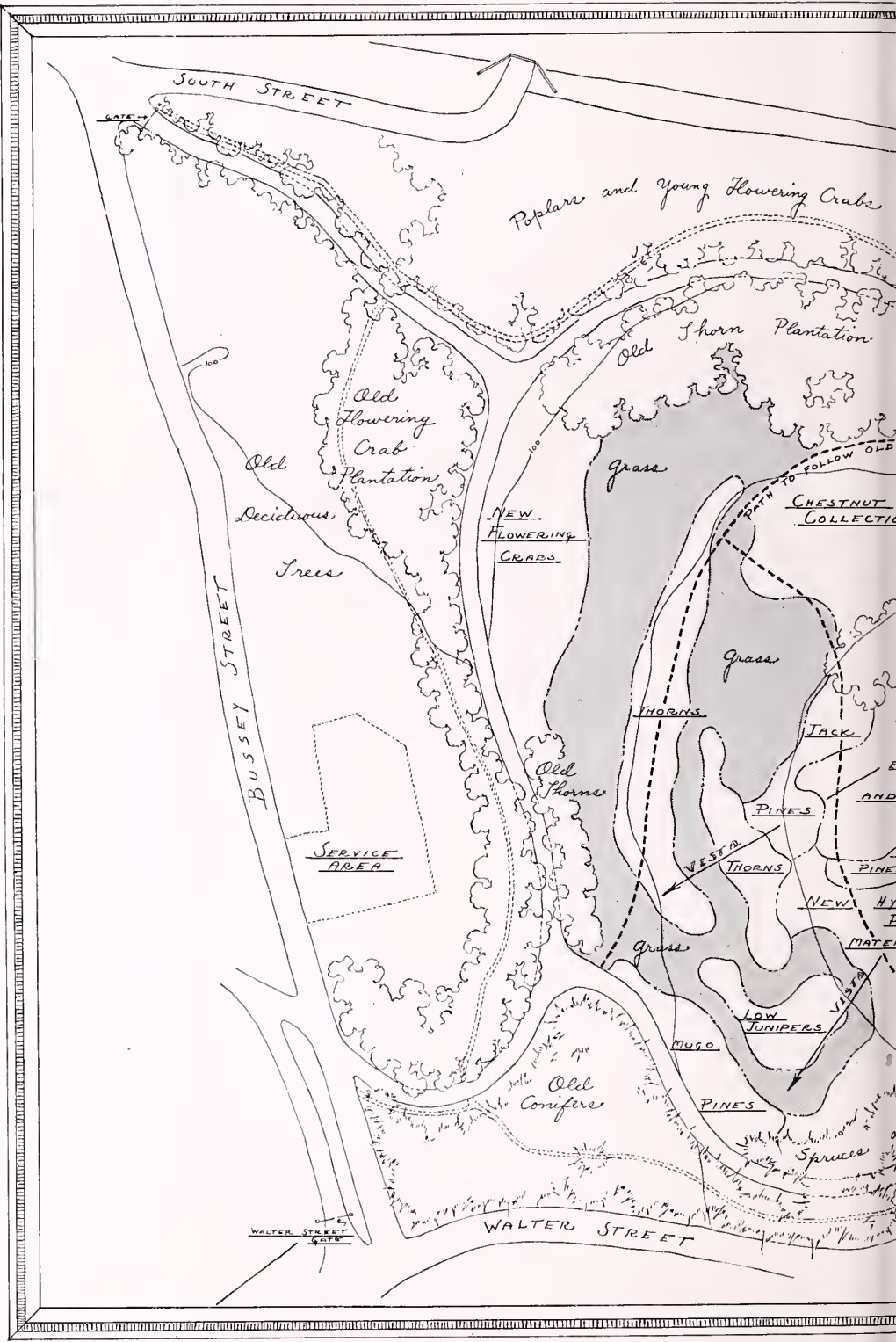
PINES

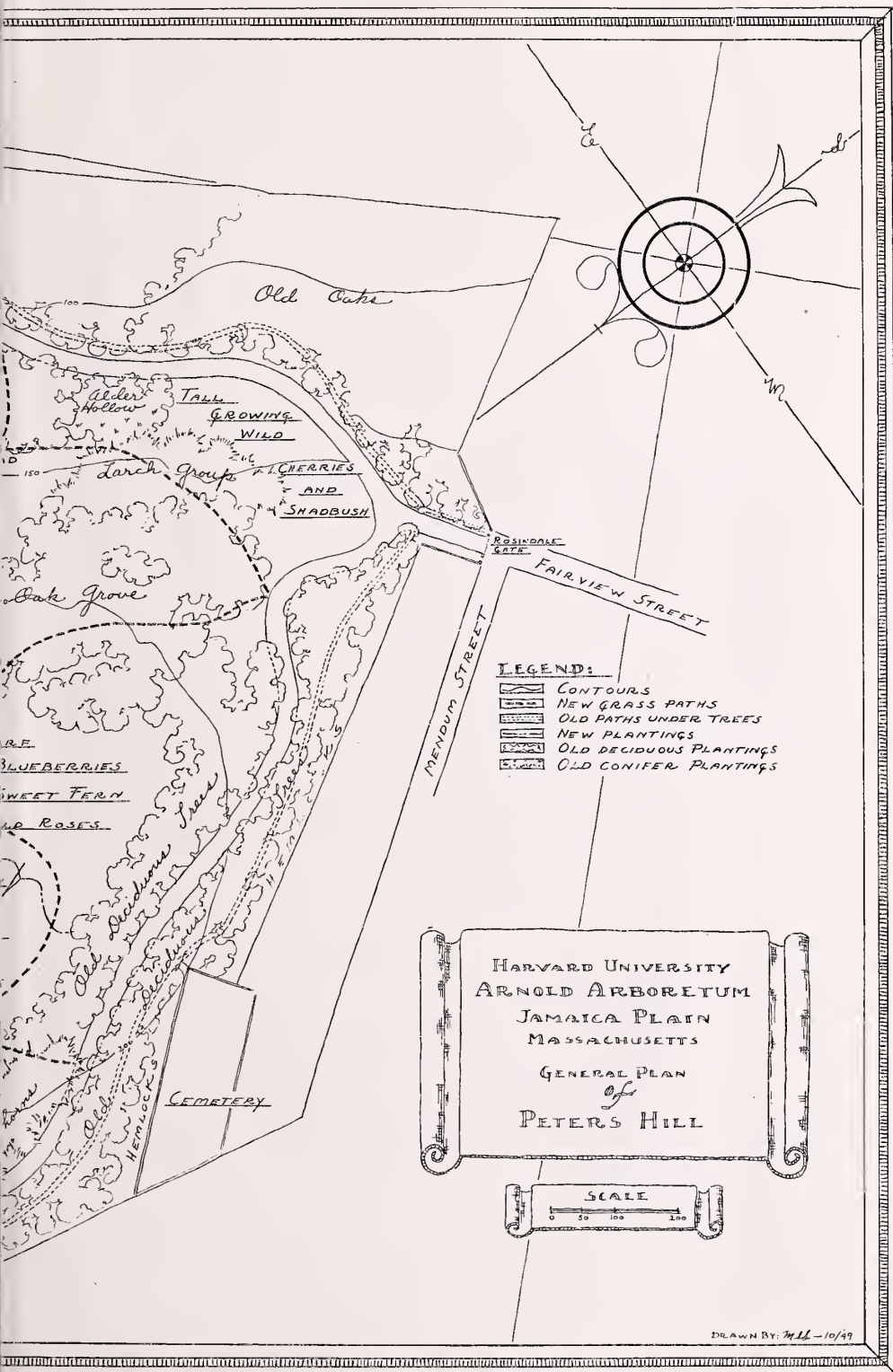
Old Conifers

Saracca

WALTER STREET GATE

WALTER STREET





drought. There may be no plants in the planters repertory that can completely fill this programme, but at least an effort will be made to try and meet the conditions, and thus demonstrate to some visitors how to solve a difficult problem near home.

This fiercely windswept and uncompromisingly dry hillside is to be used as a trial ground for the most vigorous and sturdy of the low growing shrubs that help to clothe many a picturesque Massachusetts slope. The lowest growing of the junipers, found in deserted inland pastures, will be used together with dwarf blueberries and wild roses, all of which maintain themselves unaided where Nature plants them on bare hills. If man's planting of these same little shrubs can be even moderately successful at first, later on Nature will help in spreading and increasing the swaths of brave plants which form patterns on many barren slopes. The persistent colour of junipers throughout the year, the scarlet and maroon flames of roses and blueberries remain in many memories of autumnal beauty.

A group of larches surviving from the early plantations is still in good condition on the southeast high hill levels. These are pleasing in spring when the tender green of the young needles shows brilliantly, and again in autumn when the deciduous needles turn to gold before they fall in preparation for the winter. Near the larches a small grove of tall tree cherries and plums will be planted, since types like the double flowering English Mazzard (*Prunus avium* fl. pl.) and the American Cherry (*P. serotina*) are large in stature and demand more space than can be found in the older part of the Arboretum. There are many tall growing forms of cherry and plum which are attractive in spring and as full of character in their winter structure as some of the thorn tribe. The Japanese forest tree cherries like *Prunus serrulata*, *Prunus Sargentii*, and *P. incisa* are often forgotten by planters who are hypnotized by the reiterated nurserymen's advertisements of the smaller growing, larger flowered and shorter lived horticultural varieties. The American plums, *P. americana* and *P. nigra* are attractive and their clouds of tiny flowers on their thorny black branches make them the fairest of trees in their season.

There are many interesting species in the old conifer collection on the Walter Street side of the hill and these will be preserved and cared for. For some reason this cold dry northern slope of Peters Hill seems friendly ground for some of the cone bearers and the Japanese *Pinus densiflora* and *P. Thunbergii* have grown well, in company with *Picea Glehnii* and our native red spruce, *P. rubens*. This seems likely ground for some of the conifer hybrids and among them and feathering them down to the paths and roadsides some of the dwarf pines and spruces will be set out among their taller relatives. There are, moreover, advantageous coves and curves in the old conifer groups where new and young trees will be planted and the new thorns and crabapples will have the benefit of a dark evergreen background.

Peters Hill in the difficult war years became more and more of a "problem

child'' consequently a change of treatment and arboricultural reform seemed necessary. All reforms are uncomfortable and while in process they seem more like destruction than construction, but before long the plantations planned for the hillsides should at least give promise for the future, and as time passes the new crabapples, thorns, cherries, plums and conifers will bring a renewal of beauty to the slopes. The hard conditions imposed by the situation demand the use of plant material resistant to wind, cold, heat and drought and when these become established they should show future students and visitors what may be used on many a like situation.

It is a long walk from the arid slopes of Peters Hill to the low lying ground near the Administration Building, but in fancy it can quickly be traversed and the plantation of deciduous rhododendrons appraised in the new position chosen for them. Most of them will appreciate the moister situation than the one on which they have fought and held their own on Bussey Hill. The past dry summer has been hard on newly planted shrubs, especially those which like azaleas like to feel there is moisture nearby if they need it for refreshment after a hot summer day. Much care has been given the new groups of ericaceous plants and although a few of the less vigorous have perished, the long sweep of azaleas has weathered the crisis better than could have been expected. The first crucial summer is past and soon the filling of gaps can proceed as there can be no family more varied than the members of the heath family; each with distinction of growth and elegance of bearing. All have a peculiar beauty, whether those covering the ground like bearberries (*Arctostaphylos Uva ursi*) and the heathers, or of medium height like the Chinese azalea, or of tree-like form like the *Manzanitas* (*Arctostaphylos Manzanita*) of the Siskiyous with their glowing red stems and glossy deep evergreen leaves. The neatness of their leafage, the dark shades of the persistent leaved sorts, and the magnificent autumnal colour of many of the deciduous kinds make them welcome in any garden or planting where the soil is free of lime and light enough to be to their liking. The line of azaleas and their friends, companions, and allies should in a comparatively short time give interest and beauty to the graceful curves of the Meadow Road.

The last two or three years have been difficult for everyone at the Arboretum and for visitors as well: many old trees and shrubs have had to be taken out in order to save and give space to their neighbours. Heavy pruning, temporarily defacing in some instances, has been necessary, but the crest of the hill of rehabilitation has been surmounted and in the years ahead the confusion and the difficulties will be forgotten and the patience of visitors and persistence of workers will be rewarded. The rehabilitation of Peters Hill has been made possible through the interest of a friend of the Arboretum.

BEATRIX FARRAND



PLATE VII

Rhododendron albrechtii

Sewall Brown, Photographer

26121
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GROWING RHODODENDRONS FROM SEEDS

Seed Collection and Storage

THE fruit of the rhododendron is a five to ten celled capsule. Every capsule normally contains many seeds. In the case of true species, each viable seed will reproduce substantially the same characteristics as the parent plant. Named varieties and hybrids will not, of course, come true from seeds. These special forms, however, may be grown from seeds in an effort to secure new and better varieties.

The best date for collecting rhododendron seeds will vary somewhat with the species and with the season. Thus, in 1948, *Rhododendron dauricum* capsules had dehisced on October twenty-first, while *R. obtusum kaempferi* capsules were still green. In 1947, *R. calendulaceum* were well ripened on October twentieth, but in 1948, they were still green on the same date. The ideal time for collection is when the capsules are just beginning to dehisce. It is usually possible, however, to collect well developed capsules for later dehiscence in bags or packets. This eliminates the risk of losing the seeds and frequently makes it possible to collect both early and late maturing species on the same date. In the Arnold Arboretum, seeds of most rhododendron species can be collected during the last three weeks of October.

If rhododendron seeds are dehiscing when collected, they may be packeted at once and stored in a cool, dry place. Unopened capsules will release their seeds more rapidly in a warm, dry room. They may be spread out on paper or packed in porous cloth bags. Capsules which fail to dehisce may contain good seeds. Such seeds can be obtained by crushing the capsules and screening out the debris. If it is too difficult to do this, the seeds may be sown uncleaned. Rhododendron seeds will keep well for several months in ordinary envelopes or seed packets. If seed is to be kept for longer periods, it should be tightly sealed in glass bottles and preferably stored in a refrigerator.

Soil for Seeds

Rhododendron seeds will germinate in a wide variety of soils, but a rather acid, sandy soil is best. Plenty of organic matter and good drainage are both necessary for successful growth. A mixture containing about equal parts of sandy soil, sand and leafmold or peatmoss should give good results. Many successful growers use pure sphagnum peatmoss. At the Arnold Arboretum, we have had excellent results with equal parts (by volume) of coarse sand, Canadian peatmoss, and horticultural grade vermiculite.* This mixture has the advantage of good aeration while retaining sufficient water for good growth. We add one level tablespoon of a complete fertilizer (5-8-7) to each standard flat (3x12x24 inches) of this mixture.

Damping-Off

Seeds are usually planted in soil which is already populated by many other organisms. Most of these organisms, such as nitrifying bacteria, are useful to plants, but many others, such as the fungi which cause damping-off, are definitely harmful. Since the damping-off organisms are present in most soils, even in good "clean" sand, damping-off is the most widespread and serious juvenile disease of plants. Seedlings may be attacked both before and after emerging from the soil.

Many of the failures which are attributed to poor seeds are doubtless caused by pre-emergence damping-off. The toppling over of young seedlings has been observed by most gardeners. The fungus hyphae grows both through and between the cells and the young stem soon becomes fatally weakened. The disease may be confined to a small area, but once established in a seed pan or flat, it will often spread very rapidly. A thousand seedlings can be reduced to a dozen survivors within a few days. Since the disease is soil borne, it can be most effectively controlled by treating the soil.

Heat treatment: The damping-off fungi can be destroyed by heat. A temperature of 180° F. for one hour is effective. Soil which is to be pasteurized by heat should be fairly moist before the treatment is begun. Small quantities may be treated in an oven or by drenching with boiling water. Treated soil must be allowed to cool before planting. The heat treatment has the added advantage of killing weed seeds. The chief disadvantage is that the treatment may seriously upset the balance of soluble mineral nutrients in the soil.

Chemical treatments: There are numerous chemicals which will assist in the control of damping-off, but formaldehyde gas is probably the most effective. This gas is readily available as commercial formalin, which contains about 40% formaldehyde dissolved in water. It must be emphasized that the fumes of formaldehyde are very injurious to growing plants, although relatively harmless to dormant

* Vermiculite is a micaceous ore which contains a small amount of water. The raw ore is ground into particles which are then exploded by heat. There is a water resistant type which is not suitable for most horticultural purposes. Vermiculite is widely distributed under such trade names as Terra-lite and Mica-Gro.



PLATE VIII. *Rhododendron calendulaceum*. Five pans sown February 12, 1949, photographed June 15, 1949. All seedsoil treated with formalin. In each case, the layer of the antibiotic used on top of the treated seedsoil, was about one inch thick. 1, Horticultural grade vermiculite. 2, Flowerite. 3, Sphagnum moss. 4, Soft-wood sawdust. 5, Formalin treated seedsoil only. See Table I for summary of results with this and other species.

seeds. At full strength, formalin will burn the skin and long exposure to the fumes may irritate the eyes. It is not a dangerous chemical, however, and it is reasonably agreeable to work with. At the concentrations recommended in this article, it is possible to sow rhododendron seeds in treated soil immediately following treatment. There are two methods of applying formalin to seedsoil. It may be added full strength in the process of mixing, or it may be used as an aqueous solution in watering seeded pots or flats. A liberal initial watering with a solution containing one teaspoon of formalin to two gallons of water will give good protection. In the experiments reported below, the formalin was added directly to the seed soil at the rate of one teaspoon per three standard flats (3x 12x24 inches). The formalin was first mixed with a small amount of soil and this small amount was then mixed into the entire batch. When antibiotics were used for additional protection, no formalin was added to them directly. They would, of course, receive plenty of gas from the treated soil.

Seeds which germinate in one day, such as willow and poplar, would be destroyed by this treatment. It is necessary to wait a few days before planting such quick germinating seeds in treated soil. (In an outdoor treated seed bed, it is best to wait several days before sowing any seeds. Formalin volatilizes much more slowly under outdoor conditions. The aqueous solution is most convenient for treating soil in cold frames, etc). Rhododendron seeds germinate rather slowly. Even the most rapidly developing species will be relatively inactive for the first few days. Meanwhile the damping-off organisms will have been killed and the seedlings may have time to grow through the most susceptible stages without injury.

The soil will usually become re-infested within a very few weeks, since the effect of the treatment does not last long. Indeed, this short-term protection is the chief disadvantage of the treatment. The long-term protection required by most woody plants, including rhododendrons, makes it desirable to sow the seeds on a layer of material, which will resist the growth of the damping-off and other harmful organisms, but at the same time permit the successful development of the desired seedlings. Such substances are called antibiotics because they resist the growth of the organisms which cause damping-off.

Antibiotics: During the past two years, the writer has experimented with growing rhododendrons in five antibiotic substances. These substances were sphagnum moss, soft-wood sawdust, fly-ash, vermiculite, and Flowerite.* In 1948, nine important species were grown on the first four of these substances. Flowerite was substituted for the fly-ash in 1949 and five other species of rhododendrons were included. Seeds of each species were grown in five seed pans, four pans with antibiotic substances and one pan as a seedsoil control.

Some of these substances such as sphagnum moss, soft-wood sawdust and prob-

* Flowerite is the trade name of a very lightweight granular material which is described as a sterile mineral sponge. It may be obtained from the Floral Mart, Portland, Oregon.

TABLE I
SUMMARY OF RESULTS WITH NINE SPECIES AND VARIETIES OF RHODODENDRONS
 Sown February 12, 1949; observed June 20, 1949

Lot Number	Species or variety	Substances used as one-inch layers on top of formalin-treated seedsoil				
		Horticultural grade Vermiculite	Flowerite	Sphagnum moss	Softwood sawdust	Formalin-treated seedsoil only
71-49	R. calendulaceum*	Excellent	Poor	Excellent	Poor	One seedling
72-49	R. gandavense "Charlemagne"	"	"	"	"	Few seedlings
73-49	R. gandavense "Compte de Flanders"	"	"	"	"	" "
74-49	R. gandavense "Flamboyant"	"	"	"	"	Excellent
75-49	R. vaseyi	"	"	"	"	"
76-49	R. albrechti	"	Fair	"	"	"
77-49	R. "	"	Excellent	"	"	"
78-49	R. obtusum kaempferi	"	Fair	"	"	"
87-49	R. luteum	Good	"	Good	"	Fair
90-49	R. schlippenbachii	"	Poor	"	"	Very poor

* See Plate VIII for aid in understanding terms.

ably fly-ash are true antibiotics, while the others, vermiculite and Flowerite, may owe much of their effectiveness to their initial sterile condition. In any event, seedlings developed well in all of these substances insofar as control of damping-off was concerned. There are important differences, however, in the growth rate of the seedlings. Growth has been very poor in fly-ash and poor in soft-wood sawdust. The fly-ash used was too fine to permit good aeration. It is quite possible that a comparatively coarse grade would have produced better results. Hard-wood sawdust, which is preferable to soft-wood, would undoubtedly have produced good seedlings.

During the first few weeks, the seedlings developed very slowly in Flowerite, but after several months, they were nearly as good as the best seedlings in vermiculite and sphagnum moss. The reasons for this early inhibition and later relatively rapid growth are unknown to this writer. Although very slow growth of seedlings in the early stages may make pure Flowerite an unsatisfactory substance in which to germinate rhododendron seeds, it is an interesting material which may yet prove very useful in other phases of rhododendron production.

Of the five substances under consideration, only vermiculite and sphagnum moss produced a satisfactory development of seedlings under the conditions of these experiments. Both from the standpoint of seedling emergence and subsequent growth, there appears to be no important difference between them.

Sowing Seeds

Rhododendron seeds may be sown at any time from November to May and sowing dates will vary greatly from grower to grower. Since most growers work in greenhouses or conservatories where spring comes early, many rhododendron seeds are sown in mid-February. This is the standard practice at the Arnold Arboretum. There is probably no reason, however, why good seedlings should not be produced in a sheltered cold frame. If seeds are to be planted in a cold frame, sowing should be delayed until April or May, depending upon locations and seasons. Antibiotics should be equally effective both out-of-doors and in greenhouses.

Preparation of pots or boxes: If an antibiotic is to be used, the flats or pots should be filled to within about one and one quarter inches of the top with good seedsoil. This soil should be evenly distributed, carefully levelled and slightly firmed. An additional three quarters of an inch of vermiculite, or sphagnum moss, will make an excellent seed bed. Vermiculite should never be firmed, but merely made smooth and level. Sphagnum moss may be slightly firmed. It is advantageous to have these materials reasonably moist before use. Horticultural grade vermiculite requires no screening, but sphagnum should be rubbed through a one-quarter-inch mesh. If no antibiotic substance is available, the flats or pots should be filled with formalin treated seedsoil. Good control of damping-off may sometimes be secured through the use of formalin alone, but both formalin and anti-

antibiotics were used in these experiments. After the surface of the material has been firmed or smoothed, it will be ready to receive the seeds.

Sowing the seeds: Rhododendron seeds vary in size. *Rhododendron calendulaceum* produces relatively coarse seeds and *R. vaseyi* comparatively fine seeds. With most rhododendrons, sufficient clean seeds for a five-inch pan can easily be grasped between the thumb and first finger. The finer the seed, the easier it is to sow it too thickly. Thin, even sowing is the goal.

A liberal watering, immediately after sowing, will wash the seeds into the surface of the bed. If formalin has already been added to the soil, use plain water; if not, use formalin solution. Covering is not necessary and not desirable at the beginning, although a little fine material may be added after the seedlings have begun to emerge.

The time required for germination will vary with the species. *Rhododendron schlippenbachii* should be in the seed-leaf stage in about ten days. Most other species require more time. In general, the seedlings should develop two or three true leaves and be ready for transplanting in six or eight weeks.

General Culture

Rhododendron seedlings will develop in a wide range of temperatures, but 60 to 70° F. is probably ideal. The young seedlings may be injured by high temperatures, especially if they are not carefully shaded. If, as is usually the case, they are being grown in a greenhouse, extra heavy shade should be provided during the first few warm days of spring.

The seedlings require plenty of water; lack of water is one of the main causes of failure. It is best to water seed pans from below either by partial immersion in water, or by placing the pans on sand which is always kept very wet.

A piece of glass laid flat on the rim of the pan will help to conserve moisture. This may be of great value under average home conditions, although it will not be necessary in most greenhouses. The glass should be turned every morning to prevent excessive condensation on its lower surface. If this glass is used too long after the seedlings have begun to emerge, they will be spindly.

Growth of rhododendron seedlings will often be improved by an occasional watering with Dunlop's nutrient solution. This solution contains one level teaspoon each of ammonium sulphate and potassium nitrate in one gallon of water. If the seedlings are developing too slowly, this solution should be used once every ten days. It is especially valuable when antibiotics are used, since these may contain little or no mineral nutrients. Once the seedling roots have reached the fertilized seedsoil, the nutrient solution will probably be unnecessary.

Although rhododendron seedlings have been successfully grown by using a wide variety of methods and materials, the procedures recommended here have proven very satisfactory at the Arnold Arboretum. A later bulletin will discuss the development of the rhododendron plant beyond the small seedling stage.

RICHARD H. FILLMORE

THE JAMES R. JEWETT BEACH PLUM AWARD

The James R. Jewett Award was established in 1940 "for the scientific and empirical improvement of the beach plum (*Prunus maritima*) including, however, the social significance of work with this native species or its products." This year the award has been given to the Cape Cod Beach Plum Growers Association to support their work in beach plum improvement and in maintaining proper standards of beach plum products.

Many superior varieties of beach plums have been selected, and one of the objectives of the Cape Cod Beach Plum Growers Association is to test these varieties and to select new ones. Another objective of the Association is to maintain proper standards of beach plum jelly sold in stores and roadside stands. It seems that some of the beach plum products are a mixture of beach plums and apples, although perhaps not in the ratio of one beach plum to one apple as has been facetiously suggested. The Association plans to issue distinctive labels which should insure both the processor and the public against inferior products.

The Arnold Arboretum is doing some experimental work with beach plums. We have six of the named varieties and are studying means of propagation. The use of *Prunus tomentosa* as a root stock may make transplanting a less difficult problem, especially where plants must be moved for some distance. All of the beach plum varieties are good ornamentals and the fact that they bear edible fruit only increases their value as ornamental plants.

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LOOKING TOWARDS BEACH PLUM CULTIVATION

THE beach plum, *Prunus maritima*, in typical form, is a rugged bush native to the coastal areas of northeastern United States. As part of the wild landscape in that section it is most showy when in flower during May. So white and so bold is its display of bloom that back in 1932 Edgar Anderson and Oliver Ames of the Arnold Arboretum were able to plot the wild distribution of the plant from the air. (1)

This purely decorative feature has not been overlooked by landscape planters, especially, where fairly large groupings which call for little in the way of maintenance are being considered. Once established, even on poor soil, along roadsides or in informal, unpruned hedges or mass plantings elsewhere, the beach plum will pretty much take care of itself, and bloom well every year.

Later in the season, except, perhaps, on the double-flowered form which Wilfrid Wheeler has found growing in Falmouth, Mass., the flowers give way to small plums which have long been prized for jelly making and preserving. Whereas, the show of bloom is an annual event, pollination failure, pests or other causes prevent the blooms from eventuating in clean, ripe fruit on all plants every year. Seaside residents who have for generations picked beach plums from the wild as a delightful and useful part of nature's bounty know that a good crop or "throw" oftener than one year in three is exceptional.

Whether or not intensive cultivation with its attendant pruning, feeding and spraying will always result in better fruit-set and more regular bearing remains to be seen. Pruning to keep the tops of the plants well furnished with two and three-year branches, feeding to increase the nitrogen supply and spraying to protect the fruits which do form have shown beneficial effects where tried. (2) (3)

Still to be further investigated is the matter of pollination as it may become a factor in planning plantings to avoid crop failure due to self-sterility which seems common among beach plums. (4) Also, there is the question of the influence of

weather at flowering time as it may affect the activities of pollinating insects and also prevent the complete fertilization of the flowers after actual pollination has taken place. Failure of complete fertilization may explain why, in some years, fruits form but are quickly aborted.

Such a study should prove especially important if plantings of clonal stocks are to be made. Clonal stocks are the vegetatively produced progeny of certain individual plants selected for increasing because of fruits of outstanding quality: heavy or regular bearing or other desirable properties. Such young plants, being actual pieces of the parent plants, should resemble them in every respect. Before extensive plantings of this sort are made it will be well to learn something definite about the behavior of the particular clones or varieties being set as regards self-sterility and, also, crossing with each other. In order that information may be gained on this subject, plants of the numerous clonal varieties now being named are being assembled at the Arnold Arboretum for observation in an area where beach plums do not grow wild. Where the plant does appear plentifully in a wild state in nearby fence rows, pollination of beach plum flowers during a season favorable to insect activity may be expected to present no problem.

Nor should there be any pollination difficulty when the soil conservationist's practice of planting seeds in rows on the contour to grow to maturity in place is followed. According to this scheme, a planting should be thinned after fruiting has started, leaving only sturdy plants which bear high quality fruits. In this way, size of fruit, smallness of seed, desirable color and approximately simultaneous blooming can be established throughout a planting. Because every individual in such an assemblage is a separate seedling, cross pollination seems likely to be assured, as may be impossible where entire plantings are made up of vegetative progeny of one or, at most, a few parent plants.

There is difference of opinion as to whether it is more satisfactory to plant seeds or to go to the trouble of vegetatively propagating outstanding individual plants. Those who depend upon seeds as a means of increasing beach plums say that the average quality of the general run of fruit on their plants is not sufficiently lower to justify the bother and expense involved in vegetative propagation. In this they have caught the correct attitude that the beach plum is purely a processing fruit which is wanted in volume pretty much as it now is in the wild. They recognize that the failure of numerous past attempts to put the plant into widespread cultivation can be charged to the mistake of placing it in orchard competition with dessert plums of other kinds, and of trying to "improve" it according to orchard ideas. (5) What is wanted, they say, are beach plum plants in quantity and at low cost.

On a vast scale, this attitude may be all right but the planter who makes a limited setting has little opportunity to select by thinning. He wants to know the potentials of the few plants on which he spends money, labor and space.

Even in sizable plantings, the use of clonal varieties can simplify operations.



PLATE IX

One of the earliest American illustrations of the beach plum appeared in the American Agriculturist of November 1872.

All plants of such a variety grown under the same conditions in the same place will have their blooms open and fade at about the same time. Thus spray applications may be more readily timed for effectiveness against pests and the greater protection of pollinating insects. Anyone who has made plantings of beach plum plants collected at random from the wild only to have them bloom each on its own schedule between early May and late June will appreciate the value of more uniform behavior of the flowers of whole plantings for purposes of pest-fighting alone.

Where flowering dates vary from plant to plant, it seems necessary to apply the first insect spray (after a general dormant fungicidal application early in the season) just before the first blossoms open anywhere in the planting and repeat the same spray every seven days until the last one has faded. In order to protect all plants as many as eight applications may be necessary, and some open flowers may be covered with poison. On the other hand, if uniformity of flower-opening occurred, perhaps four sprays would do the job—just before blossoms open, when the shucks split, when the shucks fall, and seven days later. Incidentally, the materials used can be those recommended for peach tree protection. On Russell B. Stearns' planting on Chappaquiddick Island this past season a combination of materials suggested by Warren D. Whitcomb of the Massachusetts Agricultural Experiment Station gave good results. It consisted of 2 lb lead arsenate, 2 lb 50% wettable DDT, 4 lb wettable sulfur, and $\frac{3}{4}$ lb Fermate in 100 gallons of water.

It appears, then, that there is plenty of reason for the vegetative increase of clonal beach plum varieties. Furthermore, advance indications from tests now in progress are that own-root vegetative progeny are going to be just about as cheap and easy to produce as are seedlings.

To date, perhaps, a dozen or more named varieties are being increased vegetatively. Some of them have been described in print and others are favorite plants which their owners consider worthy of propagation. It is not yet possible to buy plants of any of them freely. Most of these selections have been made on the basis of fruit quality without too much thought having been given to such factors as disease resistance, regularity of bearing and other particulars such as the formation on older plants of spiny, short branches which are annoying to the fruit picker. The time is coming when selections will have to be made from among the first selections.

Most publicized of the named clones are those reselected from the many outstanding plants collected in the years just before the last war by J. Milton Batchelor who traveled the North Atlantic coastal area for the Hillculture Division of the Soil Conservation Service of the United States Department of Agriculture. Since then three varieties have been named and are described as follows:

“**Hancock**” (*HC-1244*)—Fort Hancock, N. J.—“Small shrub 3' high; foliage

clean, 4-6'' annual growth; fr. 20-25 mm., flavor excellent for eating raw—sweet with little acidity; flesh, juicy golden; pit, small; matures Aug. 17 to 25; yield 1938—1½ qts.; fr. very clean and highly attractive blue. 1938 rating 85.7%. Considered best early maturing selection."

"Safford" (*HC-1252*)—Plum Island, Mass.—"Prostrate spreading; bush to 4', 30-35' spread; clean-heavy bearer; fruit 23-25 mm., sweet, good flavor, attractive deep blue, matures Aug. 15-28. Mr. Safford "best beach plum on Plum Island." 1938 rating 78.2%. 1939 rating 80.9%."

"Premier" (*HC-1358*)—Plum Island, Mass.—"Shrub 4' high with 20' spread; foliage generally clean; fruit 24-25.5 mm. diameter (25 fruits averaged 24.5 mm.), good blue, attractive medium productivity, badly infected with brown rot. Best selection observed on Plum Island and the best selection of beach plum from the standpoint of field ratings. 1941 rating 86.5%."

Also collected by Mr. Batchelor but previously named by Mr. Wheeler is:

"Eastham" (*HC-1248*) (Collins)—Eastham, Cape Cod.—"Bushy habit about 3-4 ft. Inclined to be of spreading habit. Covering area 110 feet across. Stems upright and strong. This selection produced 25 to 30 bushels of fruit in 1941 and is reported to normally bear 15 bu. annually. Carries fruit well off the ground. Leaves bright light green, long, slender. Fruit large (21 to 24 mm. in diameter) to very large average 1¾'' in diameter, color a deep purplish crimson, very attractive heavy bloom, borne along the stem in heavy masses. Quality tart but ripening to mildly acid. Seed small. Season early September but holding well on the plant in good condition for three weeks. Very attractive in flower, would make a good landscape plant because of its dense growth and enormous clusters of flowers and, later, fruit."

One other of Mr. Wheeler's numerous collections has also been described in the National Horticultural Magazine as follows:

"Wheeler Selection No. 6"—Origin Truro, Mass. Plant an upright grower 3-5'. Spreading with strong stems. Leaves large deep green, oval. Fruit medium size averaging 1½'', light blue, very attractive. Fruit borne in great profusion all along the stems. Has real beach plum flavor but ripening to a very sweet and good flavored, quality fruit. Seed medium size. This plant has a lot of character and most attractive both in flower and fruit, particularly the latter."

Mrs. Ina S. Snow of North Truro, Mass. has supplied the following information about two selections which she considers outstanding.

“Arrowhead” (A. 10)—An oval, freestone, blue plum with heavy bloom, and a flat pit. The bush is 20 or more years old, on a bank sheltered from north and east, and from west and southwest by pines. The plant measures about 12 feet across and bore a bushel of fruit in 1949.

“Snow” (A. 14)—A roundish blue plum with usual-shaped pit and excellent flavor. The bush is about 25 years old, is 10 feet across and is now beginning to get high in the middle. It is now being pruned for the first time. It is an *annual bearer*—this year about a bushel, last year about a peck. It has northern exposure and is surrounded by a mixed group of red and purple plums, none of which is very good.

Still another variety which originated as a wild plant in Eastham, Mass. has been distributed by J. H. Putnam of Orleans, Mass. Its description as supplied by notes taken by John S. Bailey of the University of Massachusetts is as follows:

“Putnam” (JHP)—“Medium to large size, largest $\frac{7}{8}$ inches in diameter, dark reddish purple, good flavor, clingstone, yellow flesh, large plum-like stone, $\frac{1}{2} \times \frac{3}{4}$ inches. This looks like an unusually large, promising, well-flavored beach plum. The bush is a vigorous, upright type.”

The New Jersey Agricultural Experiment Station has just made available plants of the following:

“Raribank” (New Jersey #1)—“Selection from the wild near Old Bridge, N.J.: established on New Jersey Horticultural Farm, No. 2 since 1932. Large tree (as large as medium size peach tree), vigorous, purplish red fruit, freestone, good quality. Has been very resistant to brown rot and free of Japanese beetle attacks. Makes excellent jelly, and can be canned as whole plums.” Raribank is self-sterile which necessitates the planting of one pollinizer with lots of less than ten or ten per cent pollinizers with larger settings. In New Jersey, two clones which blossom at the same time are being recommended for planting with Raribank. They are New Jersey #29 and New Jersey #30.

As has already been suggested, very high fruit quality and very large fruits may not be the only criteria for the selection of beach plum clones for propagation. Where high fruit quality is linked with annual bearing as is the case with the variety “Snow,” the grower is fortunate. Where it is not, perhaps, regular bearing is the more important factor. A number of observers, notably Mr. Wheeler and Mr. Stearns, have picked out varieties which seem to bear fruits regularly both in the wild and in cultivation, while plants of known better fruit quality nearby do so only occasionally. In the present state of advance of beach plum cultivation, these more dependable, if not so glamorous varieties may sup-

ply a partial answer to the demand for beach plums in quantity and borne regularly, on submarginal land with considerable modification of the rules of textbook orcharding.

As matters stand, very few beach plum plants are under actual cultivation. Most of the plants are still in the wild. To learn the behavior of the plant we still study it in the wild. We recall that, as Humphrey Marshall pointed out in his original description, "This grows naturally towards the sea coast." It may grow naturally in the area just back from the shore or, at times, high up on the beach itself but that is no hindrance to its being planted in other locations. The beach plum should grow well almost anywhere in this country. During the long history of the successive abortive attempts to popularize this species, it was grown and fruited far from the sea, even as far west as the Plains States.

Usually, transplanting to more fertile soil than that of its wild range makes for vigorous growth and greater ultimate size of plant. Instead of the starved, wind-whipped growth possible in some of its wild coastal stations, a tree-like habit may often be assumed. Sometimes, without being moved from wild surroundings back from the sea but where the soil is poor, volunteer plants have responded to feeding and manuring in the same manner.

In coastal areas where beach plum plants abound there is great variability displayed in habit from plant to plant. On upland areas back from the shore, differences in stature can often be the result of mere differences in age. Just what the life expectancy is is a matter for conjecture. Surely, it is much greater than that of he who sets the plants or picks fruit from them. More than one seaside patriarch can point out wild plants from which he has been picking fruit for as long as he can remember. Such ancient specimens hold on to life, apparently, because they are so deeply rooted that passing surface conditions like drought affect them almost not at all. Then, too, especially away from the beach on more loamy land, they throw out far-ranging shallow roots which often send up suckers to cause extension of the main plant into a thicket-like patch with the passing of the years. It is surprising that from the vast numbers of ripe fruits which fall to the ground beneath such plants, few seedlings spring up.

Sometimes, at the other extreme of habit, beach plums appear as wide-spreading patches of upright growths less than a foot tall. This can be explained by both age and environment. Such low patches are usually found both building and binding dunes just back from the high water mark of the sea but could occur in other places where the surface soil is not stabilized. Anyone who digs into such a planting soon discovers that there is much more plant beneath the soil surface than there is above it. The sequence of development was that seedlings got started on the spot long ago when the surface was level and not too far above the beach. As the wind-blown sand or soil was caught by the low branching of the beach plums and by beach grass and other vegetation, much of the top growth of the beach plums was buried, leaving only the growth of a year or two above

ground, In the years that followed, the struggle to keep from being engulfed continued as the soil piled up. Plants taken from such a location have shown great vigor when transplanted to the strong soil of an inland location. Another interesting fact about these all but buried plants is that they fruit more regularly. This suggests that the reflected warmth of the sand may have some helpful influence on flower pollination, and that low plants are more desirable than tree-like ones in some locations.

While environment is probably the greatest influence making for variability of branching and growth habit, inheritance of genetic factors in varying combinations is a probably more significant cause of differences, plant to plant. Time of blooming can be varied by environment but seems also to be genetic. Foliage characters, time of ripening, color of fruit, size and shape of fruit, size and shape of seed, resistance to disease and other such inherited variables differ so much from plant to plant that it is an easy conclusion that no two beach plum plants are alike. Perhaps, they are not but data published about thirty years ago by John Y. Pennypacker show that these characteristics are associated in a sufficiently systematic manner to establish eight major varieties—small- and large-fruited blue, purple, red and yellow. Selections of the large-fruited blue variety seem to have the greatest economic promise.

From the above review of the behavior and characteristics of the wild beach plum, it may be possible to reason out a few rules for the handling of the plants under cultivation. First, it would appear that whether they be trees, large bushes or low bushes depends somewhat on the planter's preference and somewhat on the location of the planting. Varieties of peach-tree size and habit are going to become available for inland gardens. On the other hand, for soil-binding operations or for windy, sandy seashore planting, low spreading plants seem preferable.

As for feeding, it appears that more good will be accomplished on poor, leached soil than on stronger land. Even so, there seems to be a point beyond which repeated feeding will result only in vigor of questionable value to the economy of the plants as bearers of usable fruit. Tests, as yet unfinished, indicate that liming is beneficial where the soil is very sour, as it is where most beach plum plants grow wild.

After the first few years, mulching, cultivation and other purely soil surface treatments seem to have little effect because of deep rooting. However, during the year or two after setting, while the newly transplanted plants are reestablishing themselves, such practices, plus watering, are important. Beach plum plants on their own roots do not have many fine roots or well balanced radially distributed root systems. Both seedlings and plants grown from layers or cuttings usually develop one or two major roots which during the first few years after transplanting run in the direction in which they are aimed at planting time. Therefore, the understanding planter will point these roots, or what is left of them after digging, up or down the row so that he will know where the roots are



PLATE X

Prunus maritima in full bloom by mid-May as it grows at Duxbury, Massachusetts.

during the next few years in case he wishes to water, feed or mulch. As for planting interval, bush-type plants can be set 10 by 10 feet, although, it is considered in poor soil areas that setting closer in rows on the contour and, perhaps, 10 feet apart may be more suitable. The greater interval will be necessary on strong inland soils where peach orchard spacing may be necessary, at least, for the tree-like varieties.

There are constant reports that beach plum plants do not survive transplanting in most instances. Or, if they do, they are very slow to recover and to send up new, well balanced top growth without severe pruning or actual cutting to the ground. One way to get easier reestablishment is to set plants which have been grafted or budded on the roots of some other species. One of the most likely of such understocks is *Pruus tomentosa* which is now being so used by Dr. Karl Sax, at the Arnold Arboretum. It has a radially balanced root system which is less affected by surface conditions during the year or so after planting. Also, it will make for faster top development which may lead to earlier fruiting. F. L. O'Rourke of the Michigan State College has reported that Myrobalan plum is a satisfactory understock in Michigan. Professor O'Rourke in years past was also successful with *Pruus americana*, *P. hortulana* and *P. augustifolia* as root stocks for beach plum. Just what the final outcome of setting beach plum plants worked on roots of other species will be remains to be seen. Set deeply enough, scion roots should form. If they do not, one wonders about the longevity of plants so propagated.

Because the beach plum is naturally so long-lived, it is the author's inclination to use plants which are own-root from the start. It is beginning to be evident that they can be made to establish themselves satisfactorily by adopting a change in planting method. Instead of setting them in the natural vertical position, this writer now plants them—spring or autumn—flat on their sides on the ground in a wide hole or a furrow about eight inches deep. The roots are buried but the horizontally placed stems are left exposed to the light until new growth has started, as it will pretty much along the whole length of the stems. During the first growing season, the soil is gradually filled in about the new shoots as they extend upwards, until the soil surface is again level. By following this method, few, if any, plants have been lost and newly set plants finish the first season of growth after transplanting with up to as many as a dozen new shoots from below ground level instead of the one or two stems on plants planted in the conventional manner, if the latter are still alive. Also, under this system, the one or two root stubs on a poorly rooted plant can be aimed down at moisture if so desired. There is nothing new about this method of planting. It was recommended for the setting of holly hedges centuries ago. Even so, it is a technique of present value, especially for beach plums which are being planted for soil conservation purposes with the hope of eventual fruit to repay some of the cost and trouble of placing them to bind the soil.

It seems, then, that with the precedents set by those other two native plants, cranberry and blueberry, something in the way of economic development may be expected from the beach plum. There are many people who think so. Fortunately, these beach plum enthusiasts are no longer working in isolation. In New England, at least, they are now organized as the Cape Cod Beach Plum Growers Association. This organization, under the guidance of Bertram Tomlinson of Barnstable, Mass. is now coordinating present efforts to bring to reality something that has been talked about for generations. An earlier important step towards the exploitation of the beach plum was the establishment of the James R. Jewett prizes in 1940. Doctor Jewett, Professor of Arabic, Emeritus at Harvard University turned over the sum of five thousand dollars to the Arnold Arboretum, the income from which is to be used for the development of beach plums. Two prizes have been offered annually for the two individuals who, in the opinion of a special committee have done the most towards the exploitation of *Prunus maritima* in the previous twelve-month period. These are known as the James R. Jewett prize and the Vieno T. Johnson prize, the latter commemorating an old employee of Dr. Jewett.

Neither prize has been awarded every year since. Those who have won the James R. Jewett prize are Mrs. Wilfrid O. White, Vineyard Haven, Mass., 1941; J. Milton Batchelor, then of the Hillculture Division of the Soil Conservation Service of the United States Department of Agriculture, 1942; Wilfrid Wheeler, Falmouth, Mass., 1943; Bertram Tomlinson, County Agent of the University of Mass. in Barnstable County, Mass., 1944; George Graves, 1945, 1948; Cape Cod Beach Plum Growers Association, 1949.

The Vieno T. Johnson prize was won by Mrs. Ina S. Snow, North Truro, Mass., 1941; William Foster, East Sandwich, Mass., 1942; Peter Hansen and his sister Miss Anna Hansen, Truro, Mass., 1944; Fred F. Dill, North Eastham, Mass., 1945.

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*Editors Note—

Mr. Graves became interested in the beach plum over ten years ago and has done a great deal of work with it in the form of propagation, growing and experimentation during the course of that time. This article, together with the information contained in the bibliography, should bring our information up to date concerning this plant.

